

THE COCCIDAE OF SOUTH AFRICA—III.

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(PLATES XII–XVI.)

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Genus **Cryptaspidiotus**, Lindinger.

Like *Aspidiotus*, except that the adult ♀ remains enclosed in the skin of the 2nd stage, with the exception of the pygidium, which extends through the hind part of the enclosing skin, beyond the posterior margin of the 2nd stage female (fig. 114).

97. **Cryptaspidiotus austro-africanus**, Lindg. (Plate xii, fig. 114).

A. austro-africanus Lindinger, Jahrb. Hamb. Wiss. Anst., xxvii, p. 505, 1910, and xxvii (3), p. 41, 1911.

The ♀ of this species makes conical depressions in the stems of its host-plant. The body of the insect is thus below the general surface and is covered by the scale, which is generally level with, or slightly below, the surrounding plant tissue.

Female scale flat, \pm circular, whitish grey or yellowish, with \pm central exuviae which are darker yellow. Scale about 1 mm. in diameter.

Adult ♀ enclosed in the 2nd stage skin, pear-shaped, almost colourless, with rounded yellowish pygidium. Pygidia of 2nd stage and adult as illustrated in natural position (fig. 114). Circumgenital glands 0.

Second stage ♀: P_1 , L_1 , $2P_2$, L_2 , $2P_3$, L_3 , 3–5 P_4 .

Adult: P_1 , L_1 , P_2 , L_2 , L_3 .

In the adult the lobes are undeveloped, and appear as irregular projections of the margin, and the plates are generally obscure or absent. There is a long stout spine immediately outside the median lobes, and a pair of shorter ones outside L_2 and L_3 .

Habitat : On *Euphorbia* (tree), Mariannhill, Natal (type locality).

Collection No. : 215.

Genus **Chrysomphalus**, Ashm.

Scales \pm similar to those of *Aspidiotus*, but usually darker, or more compact, robust, and capsular; generally circular, with central exuviae; sometimes \pm elongate, with the exuviae towards one end. Pygidium with at least three pairs of lobes and *strong, very often long paraphyses*. Beyond the outer lobes the body margin is often thickened and \pm toothed.

Three sub-genera are recognised, which may be distinguished by the following particulars:—

1. Scale neat, smooth, much like *Aspidiotus*, with bright, \pm transparent, usually reddish or yellowish exuviae; pygidium with three distinct pairs of lobes and beyond these three distinct plates; e.g., *figus*, *dictyospermi*, etc.

Chrysomphalus (s. str.).

2. Scale with dark, usually black exuviae; plates most often fused.

(a) Scale dense, slightly capsular, often partly hidden by outer layers of bark; pygidium triangular or keel-shaped, strongly pointed, with three pairs of lobes and beyond these some plates; plates all short, inconspicuous, usually forked, as if formed by two or more dagger-shaped plates fused together; e.g., *obscurus*, *corticosis* *Pseudischnaspis*.

(b) Scale very dense, entirely capsular, often obscured by bark, rounded, with four pairs of lobes and beyond these no plates, or only inconspicuous ones; plates usually small; e.g., *phenax* *Melanaspis*.

Key to South African Species of Chrysomphalus.

A. Pygidium with 3 pairs of lobes.

a. Pygidium with well-defined plates.

(1) Scale transparent, showing reddish φ below; P_4 not much longer than L_3 ; circumgenital glands 0 (fig. 118) *C. aurantii*, Mask.

(2) Scale dark with orange red exuviae; circumgenital glands present (fig. 117).
C. figus, Ashm.

(3) Scale black, with greyish or brownish exuviae; circumgenital glands present (fig. 116) *C. rossi*, Mask.

(4) Scale brownish; P_4 much longer than L_3 ; circumgenital glands present (fig. 115) *C. dictyospermi*, Morg.

b. Pygidium without well-defined plates.

(5) Scale dark brown, greyish or blackish, usually covered by bark tissues; circumgenital glands present (fig. 119) *C. corticosis*, sp. n.

B. Pygidium with 4 pairs of lobes.

(6) Scale black, capsular ; plates inconspicuous ; circumgenital glands 0 (fig. 120)
C. phenax, Ckll.

98. ***Chrysomphalus aurantii*** (Mask.) Ckll. (Plate xii, fig. 118).

Aspidiotus aurantii, Mask., N Z. Trans., xi, p. 100, 1878.

Aspidiotus citri, Comstock, Canad. Ent., xiii, p. 8, 1881.

Aonidiella aurantii, Berl., Riv. Pat. Veg., iv, p. 83, 1895.

Chrysomphalus aurantii, Ckll., Check List Sup., p. 396, 1899.

Common Name : Red Scale.

Female scale about 2mm. in diameter, nearly circular, often slightly broader than long, with thin flat margins and the central area flatly convex, generally appearing shiny or polished. The orange-red or yellowish colour is due to that of the female insect beneath the scale. The dorsal scale is thin, pale yellowish-grey, and almost transparent. Its true character is often visible only at the extreme margin of the scale. The exuviae are regularly central, orange-red or yellow, covered by a thin layer of secretion, and there is a small prominent spot with a concentric ring of whitish secretion in the centre of the larval exuviae. The ventral scale is complete, and stout at the margins, remaining attached to the dorsal scale. The adult ♀ is thus enclosed when the scale is removed and is extracted only with difficulty, except in boiling KOH.

Male puparium about 1 mm. long and 0·6 mm. broad, \pm oblong, but narrowed behind, dull reddish-brown, paler at the margin. Exuviae towards the anterior end, often slightly more reddish than the scale itself, and covered with secretion as in the ♀ scale.

Adult ♀ viviparous ; when alive, orange-red, reniform, with the abdominal segments retracted and often enclosed by the sides of the thorax. The body is flat beneath and convex above, with the skin moderately hard and chitinous. When mounted the body of mature specimens retains its characteristic shape, and the average size is 1·1 mm. long and 1·3 mm. broad. In younger forms the body is broad pear-shaped.

Antennal tubercles small, set well back from the mouth-parts, with one long, slightly curved spine.

The pygidium (fig. 118) with three pairs of well-developed lobes and well-defined plates. L_1 and L_2 usually distinctly notched on both margins, the outer notch of L_2 being more pronounced ; L_3 usually only notched on the outer margin ; L_2 is a little smaller than L_1 , and L_3 than L_2 . P_1 , P_2 and P_3 not very broad at the base, with long projections, of which the outer ones are slightly branched. L_4 wide at base, with elongate projections, of which there are normally two plates (a) an inner part which is simple, and (b) an outer which is feebly branched and whose outer edge is toothed. Paraphyses short and more delicate than in the other South African species of *Chrysomphalus*. Circumgenital glands absent ; exceptional specimens have been observed where a solitary gland has been present and Lindinger reports specimens from the tropics in which an anterior group is represented by 1-2 glands. Formula : P_1 , L_1 , $2P_2$, L_2 , $3P_3$, L_3 , $3P_4$.

Historical Note: When Mr. C. P. Lounsbury first came to South Africa as Entomologist of Cape Colony, in August 1895, *A. aurantii* was one of the first insect pests to attract his attention. In his 1896 Report, p. 48, he states:—

“The Red Scale is wide-spread and destructive in Cape Colony. I have been unable to find any clue to the time or place of its introduction into this country, but its general occurrence in nearly all parts of the Colony, as well as in the neighbouring states, would seem to be a good indication that it has been with us a long time. Aged farmers claim to have known it in their boyhood, and an observant Cape Town gentleman, who has always taken a great interest in gardening, is positive that it was present on orange trees on his father's estate at Sea Point (near Cape Town) as far back as 1857. I have seen it in all of the dozen or more districts that I have visited, and have received it from at least a dozen others. But in many isolated orchards it does not yet occur, although in a few cases known to me the trees are upward of a hundred years old.”

It seems highly probable that this insect had been introduced years before, possibly with citrus trees from the East, may be Java, when trees were brought by the commanders of the old East India Company vessels as presents for the Constantia or Cape Peninsula inhabitants who entertained them. This would account for the hold the species had on the old oak trees (often far removed from citrus), on apple and pear, and on the old rose hedgerows, some of which were killed by the pest. It is now widespread throughout the Union and its list of food-plants very large and varied.

Habitat: Common throughout the Union. It is most commonly a serious pest on citrus, rose, apple, pear, oak, mulberry, camphor and privet. It has also been reported on:

Abutilon, *Acacia* spp., *Acer*, *Agave*, alder, almond, aloe, *Ampelopsis*, *Aralia*, *Aucuba*, *Araucaria* spp., asparagus, avocado pear, *Bauhinia*, belhambra (*Phytolacca dioica*), *Benthamia*, *Berberis*, *Bignonia*, *Bougainvillea*, *Borwardia*, box, broom, *Callistemon*, *Camellia*, carob, castor-oil, *Casuarina*, *Cedrela*, *Cestrum*, chestnut, chilli, *Choisya*, *Chrysophyllum*, *Clerodendron*, clematis, *Clivia*, *Convallaria*, *Coprosma*, *Cordyline*, *Cornus* spp., *Cryptomeria*, *Cupressus* spp., currant, cycads, *Cyperus*, dahlia, *Deutzia*, *Dombeya*, *Doryanthes*, *Duranta*, *Dracaena*, *Elaeagnus*, essenwood, *Eucalyptus*, *Eugenia*, *Euonymus*, *Ficus* spp., *Forsythia*, frangipani, fuchsia, ginkgo, *Gleditschia*, grape, *Grevillea* spp., *Greyia*, guava, *Gynura*, *Hakea*, hawthorn, holly, *Hydrangea*, *Impatiens*, ivy, *Jacaranda*, jasmine, kaffirboom (*Erythrina* sp.), Kei-apple, *Kennedya*, *Libonia*, lilac, *Liriodendron*, laurel, *Lagerströmia*, *Mackaya*, mango, mangosteen, *Maranta*, *Melia*, New Zealand flax, oak, oleander, orchids, *Osmanthus*, palms, *Pandanus*, peach, poeny, *Penstemon*, persimmon, phlox, *Pinus* spp., *Pitosporum*, plane, plum, *Poinsettia*, poplar, quince, *Rhamnus* sp., *Robinia*, *Salvia*, sneezewood, *Sophora*, *Spiraea* spp., *Statice*, *Sterculia*, *Strelitzia*, *Taxodium*, *Thuya*, *Trichilia*, *Trichocladus*, *Tristania*, *Toxicophlaxa*, *Veronica*, *Viburnum*, walnut, willow, wistaria, *Yucca* and *Zinnia*.

Collection No. : 234.

99. ***Chrysomphalus ficus***, Ashmead (Plate xii, fig. 117).

Chrysomphalus ficus, Ashm., Am. Ent., iii, p. 267, 1880.

Aspidiotus ficus, Comst., Rept. U.S. Dept. Agr., p. 296, 1881.

Chrysomphalus aonidum, Ckll., Biol. Cent. Amer., ii, pt. 2, p. 25, 1899.

Aspidiotus ficus, Fuller, 1st Rept. Ent. Natal, p. 100, 1901.

Aspidiotus ficus, Newst., Mon. Brit. Coccidae, i, p. 104, 1901.

Chrysomphalus aonidum (Linn.) Fernald, Catalogue, p. 286, 1903.

Scale of adult ♀ circular, about 2 mm. diameter, purplish brown or blackish, with distinct reddish or orange red exuviae. In fresh specimens, especially on rose, the scale is covered by a delicate waxy bloom. In young specimens the covering of the first exuviae is white.

Male puparium dark brown, with pale margins and reddish exuviae.

Adult ♀ broadly rounded in front, broad pear-shaped and noticeably pointed behind, about 1 mm. long, yellow in colour when mature, very pale or almost colourless when young. In mounted specimens the broadest part of the body is seen to be situated a little posterior to the level of the mouth-parts. In front of this point the cephalothorax is uniformly rounded, but suddenly narrows by a slight shoulder on each side and from this point tapers gradually to the pygidial margin. Each shoulder is armed with a small sharp series of slender spines placed at wide intervals.

The pygidium (fig. 117) has three pairs of well developed lobes which are sub-equal in size: L_1 and L_2 distinctly once notched, L_3 with the outer margin \pm serrate, or crenulate. Plates rather deeply fringed. Beyond the lobes and plates the margin is thickened. There are five pairs of prominent paraphyses, as shown in fig. 117; occasionally there is an indication of an additional small one from the outer edge of L_3 . Circumgenital glands in 4 groups:—

$$\begin{array}{cc} 6-8 & 6-8 \\ 2-4 & 2-4 \end{array}$$

Formula: $P_1, L_1, 2P_2, L_2, 3P_3, L_3, 3P_4$.

Habitat: Common, especially in the coastal area of the Union, on a large variety of plants, including avocado, camellia, citrus, palm, rose, fig, guava, ivy, mango, oleander, privet, "umbenda" (native tree), and many others.

Collection No.: 233.

100. *Chrysomphalus rossi* (Mask.) (Plate xii, fig. 116).

Aspidiotus rossi, Mask., N.Z. Trans. xxiii, p. 3, 1890.

A. (Chrysomphalus) rossi, Ckll., Bull. U.S. Dept. Agr., T.S. 6, p. 27, 1897.

Chrysomphalus rossi, Leon., Gen. e Spec. Dias. Asp., p. 157, 1900.

Scale of adult ♀ usually large, about 3 mm. in diameter, generally circular, but elongate on narrow leaves such as pine, or when against the mid-rib of a leaf; dull opaque black, with a brownish or greyish centre.

The adult ♀ is broad pyriform, purplish or deep plum-coloured, with the pygidial extremity yellowish. The abdominal segments are not produced and segmentation is obscure. The antennal tubercle is small, with one long hair and one short spur. There is a submarginal series of hairs around the body at wide intervals. Parastigmatic glands 0.

The pygidium (fig. 116) has three pairs of well-developed lobes, the outer edges of which slope backward, conforming with the curve of the pygidial margin. Each

lobe is notched once on its outer edge. The plates are broad and deeply fringed. Beyond the lobes and plates the margin is thickened and has chitinous processes similar to the paraphyses but thinner and more indefinite. It is \pm notched, but not roundly indented as in the variety mentioned later. There are 7 definite pairs of paraphyses, as shown in fig. 116. Circumgenital glands in 4 groups :—

7—9 7—9 8—8
3—5 3—5 usually 4—4

Formula :— $P_1, L_1, 2P_2, L_2, 3P_3, L_3, 3P_4$.

Habitat : Cape Town, East London, Grahamstown, Queenstown, Estcourt, Dundee, Durban, Pietermaritzburg, Johannesburg, Pretoria, Krugersdorp, Pietersburg, Bloemfontein.

C. rossi is commonly found on :—*Acacia melanoxylon*, *Buxus* sp., *Euonymus*, *Hakea*, ivy, oleander, *Phormium tenax*, and *Pinus pinaster*; and it has also been recorded on :—*Aucuba*, bottle-brush (*Callistemon*), *Camellia*, *Carissa*, *Cordyline*, *Ceratonia*, *Cupressus* spp., croton, *Dracaena*, *Grevillea*, hawthorn, ilex, laurel, mahogany, oak, *Pandanus*, palms, pepper, rose and *Yucca*.

Collection No. : 238.

100a. ***Chrysomphalus rossi*** (Mask.) var. **greeni**, Brain & Kelly.

Aspidiotus rossi, Green, Cocc. Ceylon, i, p. 35, 1896.

Chrysomphalus rossi var. *greeni*, Brain & Kelly, Bull. Ent. Res., viii, 2, p. 184, 1917.

Mr. Green's description of this insect, omitting figure references, is as follows :—

"Female puparium circular, or irregularly oblong, flattish, opaque, reddish brown or dark brown; inner surface darker, almost black. Pellicles blackish, frequently obscured by a layer of brownish secretion, with central boss and concentric ring; sometimes depressed, sometimes slightly elevated. Ventral scale obsolete, a white powdery film on surface of leaf, except at margins, where it is stouter and adheres to the dorsal scale. Diameter 2 to 3 mm.

"Male puparium stated by Maskell to be smaller and lighter in colour than that of the female. I have not found the male insect in Ceylon.

"Adult female broadly pyriform, terminal segment tapering suddenly to a point; median area tumescent; margins flattered. Colour of living insect at first milky white or ochreous, tinged with purplish, which deepens with age and extends over the greatest part of the thorax, the flattened marginal area and the abdominal segments remaining ochreous. Colour of dead and dried insect, brownish yellow. Stigmata conspicuous; no parastigmatic glands. Pygidium with six prominent, obscurely tricuspid lobes, all well developed and sub-equal in size; margin beyond the lobes with seven projecting tooth-like processes, forming a bold and regular serration; margin between the lobes squarely but not deeply incised. Squames deeply fringed, two between median lobes, two between first and second, three between second and third, and one or two in the space between the third lobe and the first marginal prominence. Circumgenital glands in four groups; upper laterals with 9 to 12 orifices, lower laterals with 8 to 9, their position indicated in the living insect by the presence of four white waxy patches. A large number of very delicate

filiform tubular spinnerets, opening on the dorsal surface by small and rather inconspicuous pores arranged in definite series running upwards from the margin. Larger cylindrical or trumpet-shaped ducts nearer the extremity, opening on the margin between the lobes. Anal aperture slightly caudad of the lower spinneret-groups. Length, about 1.50 mm.

“Adult male unknown.

“Eggs pale purplish. Hatched shortly after extrusion. Well-developed embryos can be seen within the body of the parent insect.

“Young larvae very pale reddish, broadly oval; caudal setae short.

“Habitat in Ceylon on under-surface of leaves of *Capparis moonii*.”

I find what is undoubtedly this species on a native tree (*Chaetachme aristata*, Planch.) at Durban and also on a native shrub from East London, C.P. (Cape No. 1248). This is certainly distinct from typical *rossi*, of which I have abundant material from Australia, and is readily distinguished by the following characters:—

<i>C. rossi</i> , Mask.	var. <i>greeni</i> .
♀ scale black, with lighter area over exuviae.	♀ scale brown, with darker area over exuviae.
Margin of pygidium, beyond lobes and plates not deeply notched.	Margin deeply notched or bayed in.
Circumgenital glands:—	Circumgenital glands:—
7—9 7—9	9—14 9—14
3—5 3—5	7—11 7—11

The whole pygidium of the variety is wider than in *rossi*, and in a few cases, at maturity, the pygidium is retracted.

Collection Nos.: 211, 249.

101. *Chrysomphalus dictyospermi* (Morgan) (Plate xii, fig. 115).

Aspidiotus dictyospermi, Morgan, Ent. Mo. Mag., xxv, p. 352, 1889.

Aspidiotus dictyospermi var. *arecae*, Newst., Ent. Mo. Mag. xxix, p. 185, 1893.

Chrysomphalus degeneratus, Leonardi, Riv. Pat. Veg. iv, p. 345, 1896.

A. (Chrysomphalus) dictyospermi, Ckll., Bull. U.S. Dept. Agr., T.S. 6, p. 23, 1897.

Chrysomphalus minor, Leon., Riv. Pat. Veg. vii, p. 214, 1899; id., Gen. e spec.

Dias. Asp. p. 169, 1900.

Chrysomphalus dictyospermi, Fernald, Catalogue, p. 289, 1903.

Scale of adult female \pm circular, about 1.7 mm. in diameter, flat at margins with raised centre, reddish-greyish, to dark-brown with paler margins, often semi-transparent. Exuviae yellowish to blackish-brown from above, but bright reddish-brown and glossy from below. In one lot of material on guava from Barberton (No. 236a) the entire ♀ scale is brown, matt, with the exuviae concolorous.

Male puparium more elongate, about 1 mm. long and 0.7 mm. broad, more greyish-brown in colour.

Adult ♀ partly viviparous at least; mounted specimens usually contain many embryos. When mounted, broad pear-shaped, about 1.2 mm. long and 1 mm. broad, hyaline, margin with a sparse marginal series of spine-like hairs.

The pygidium (fig. 115) is very much like that of *C. ficus*, but can be readily distinguished by P_4 . There are usually 3 of these plates, of which the first two from L_3 are divided into two parts, the inner half being small and linear, the outer much longer and broadened, reminding one of an inverted *Cupressus pyramidalis* tree. Small variations are noticeable in the lobes and paraphyses, of which the most striking are: (a) the lobes are normally decidedly notched on their outer margins, the notch being often absent from L_1 and L_2 in old specimens; (b) the fourth pair of paraphyses from the middle line are sometimes much broadened near the apex and do not appear to extend to the margin. Very thin, delicate tubular glands numerous. Circumgenital glands in 4 groups:—

4—5 4—5

1—3 1—3

Formula :— $P_1, L_1, 2P_2, L_2, 3P_3, L_3, 2-3P_4$.

Habitat: On guava; collected by J. W. Hodgson, Barberton, Tvl., 17th June, 1915. On palm and rose, Pretoria; collected by Miss Impey, April 1916. On umkovoti (*Chaetachme aristata*, Planch.) Durban, Natal; collected by C. Fuller. On camellia, Pietermaritzburg; collected by A. Kelly. On mango, Nelspruit; collected by J. W. Hodgson. Also on *Cupressus macrocarpa*, rose, peach, etc., from Cape Town, East London, Kingwilliamstown and Kimberley.

Collection Nos.: 236, 236a, 242, 244.

102. **Chrysomphalus (Pseudischnaspis) corticosus**, sp. n. (Plate xii, fig. 119).

Common Name: South African Obscure Scale.

Scale of adult ♀ varying greatly on different host-plants. On smooth-barked plants it is very large and flat, reaching 3.2 mm. in diameter, brownish to black in colour, with the blackish exuviae covered. As a rule, however, the scale is almost or entirely covered by the outer layers of bark of the host-plant. On *Rhus* this is usual, and it has been submitted on many occasions as a burrowing scale. On *Robinia* the scale takes the greyish appearance of the bark, but the black exuviae are very conspicuous with a greyish white concentric ring. On wild olive, on the other hand, it forms a thick crust of blackish or greyish black scales, which easily flake off. The scale itself, without any admixture of tissues, is pitchy black, with concolorous exuviae. Seen from below the scale is domed and very glossy. The ventral scale is delicate and usually remains on the host-plants.

The adult ♀, when alive, is purplish to plum-colour, but turns dull brown when old or dead. The body is broad pear-shaped, about 1.5 mm. long and 1.2 mm. broad. Antennal tubercles small, with one long, curved seta. Parastigmatic glands 0. The arrangement of lobes and plates is very similar to that of *obscurus* (fig. 121), to which this species is very close. The most striking differences in the pygidium are the longer and stouter paraphyses, the presence of two distinct paraphyses between the median lobes, and the presence of a greater number of dorsal glands. The pygidium is as illustrated (fig. 119). Circumgenital glands in 5 groups:—

6—9

17—24 17—24

9—16 9—16

Habitat : This species seems to be common throughout the Union on wild olive, keurboom (*Virgilia capensis*, Lam.), kaffirboom (*Erythrina caffra*, Thunb.) and several other native trees. It apparently takes readily to cultivated plants and has been received on apple, hawthorn, kei-apple, lilac, native plant (*Celastrus* sp.), olive, pear, poplar, plane, privet, pepper (*Schinus molle*, Linn.), *Robinia* sp., rose, peach, plum and walnut.

Collection Nos. : 240 and 240e.

103. **Chrysomphalus (Melenaspis) phenax**, Ckll. (Plate xii, fig. 120).

Chrysomphalus phenax, Ckll., The Entom. xxxiv, p. 225, 1901.

Scale of adult ♀ small, about 1.5 mm. in greatest diameter, convex, capsular, black, but covered with a secretionary layer of yellowish brown material which shows concentric markings. Exuviae nearly always nearer to one side and covered with a whitish or greyish layer. In very young scales there is a faint concentric ring and dot effect. Ventral scale dense, black.

Adult ♀ broadly oval, about 1.1 mm. long and 0.9 mm. broad, widest just about level of mouth-parts and suddenly shouldered and narrowed to the broad flattened pygidial area. Body hyaline, except the mouth-parts and pygidium, which are yellow. Antennal tubercles small, with one long, curved spine and several small processes, conspicuous because of the "corrugated" chitin surrounding them. Parastigmatic glands 0. Pygidium broad (fig. 120), with four pairs of well-developed, crenulate lobes and three lobular projections of the margin beyond them. Plates rudimentary or absent. Paraphyses stout, and very conspicuous (fig. 120). Circumgenital glands 0.

Remarks : Professor Cockerell's original description is as follows :—

" ♀ scale dark grey, resembling an oyster, with the sublateral exuviae shining black. ♀ no circumgenital glands; anal orifice small, about 9μ long, oval, about 63μ from bases of median lobes; lobes four, crenulate, shaped as in *C. mimosae*, but the median lobes are broader, angular instead of sloping on the outer side; margin beyond the lobes denticulate and finely crenulate; club-shaped thickenings at inner bases of median lobes, about twice length of lobes; a pair of thickenings between first and second lobes, as in *mimosae*; three thickenings between second and third lobes, the middle one longest; two at interval between third and fourth lobes, the middle one being absent; one or two beyond the fourth."

Habitat : On *Acacia horrida*, Willd. (not *Mimosa* as stated by Cockerell), Verulam, Natal; collected by C. Fuller. Nelspruit, Tvl.; collected by C. P. Lounsbury. Pretoria; collected by B. Delpont, December 1913. Grahamstown, C.P.; collected by A. Kelly, March 1915.

Collection Nos. : 237, B237, B237a, 253.

Genus **Pseudaonidia**, Ckll.

The scales are similar to those of *Aspidiotus*, and some of the ♀ insects have the cephalothorax distinctly separated from the abdomen as in the subgenus *Selenaspis*. On the dorsal side of the abdomen, however, there is an embossed area reminding one of that of *Ischnaspis*. The body colour is usually wine-red when the insect is

alive, and the plates simply or feebly branched. In some cases there are clubbed thickenings running back from the lobes, somewhat similar to those in *Howardia*.

As constituted at present this genus is entirely unsatisfactory, as it contains insects which are apparently not closely related. Thus, if *trilobitiformis* with fringed plates (fig. 126) be taken as typical, the native South African species are distinct by the absence of such, or else by the presence of simple plates. The character of the scale is different, and the *Howardia*-like paraphyses found in some species are unusual and point to a burrowing habit in the female stage. Circumgenital glands may be present or absent.

Key to South African Species of Pseudaonidia.

A. Pygidium with long, clubbed paraphyses.

- (1) Scale large, flat, slightly obscured by outer layers of host-plant; pygidium with three pairs of paraphyses (fig. 123) .. *P. tesserrata*, d'Emmerez.
- (2) Scale large, convex, covered by outer layers of host-plant; pygidium with two strong pairs of clubbed paraphyses (fig. 125).. *P. clavigera*, Ckll.
- (3) Scale of adult ♀ black, capsular, covered by bark of host-plant; anal opening covered by large forked flap (fig. 128) *P. laciniae*, sp. n.
- (4) Adult ♀ small, densely chitinous, with two large clear areas; pygidial margin crenulate (fig. 122) *P. glandulosa* (Newst).
- (5) Scale of adult ♀ large, black, blister-like; L_2 narrower than L_1 or L_3 ; pygidium with four pairs of clubbed paraphyses (fig. 127) *P. nigra*, sp. n.

B. Pygidium without distinct paraphyses.

- (6) Scale of adult ♀ large, flat, brown; plates forked; circumgenital glands present (fig. 126) - *P. trilobitiformis*, Green.
- (7) Scale of adult ♀ about 1.6 mm. diam., buff, moderately convex; plates simple, dagger-shaped; circumgenital glands absent (fig. 124) .. *P. lycii*, sp. n.

104. ***Pseudaonidia tesserrata*** (d'Emmerez) (Plate xii, fig. 123).

Aspidiotus (Diaspidiotus) tesserratus, d'Emmerez, Pr. Soc. Amic. Scien., p. 23, 1899.

Aspidiotus (Pseudaonidia) tesserratus, Lefroy, West Indian Bull., iii, p. 247, 1902.

Scale of adult ♀ large (may reach 3.5 mm. in diameter), circular, flatly conical, completely covered by the outer flaky layers of bark, but with the central, small, brown exuviae showing through. The scale, with the bark removed, is dull red-brown, with a roughened surface. It is \pm capsular, with a dense brown ventral scale. The interior is covered with a thin layer of white powdery wax, which is quite conspicuous when the dorsal scale is flaked off.

The adult ♀ is large, about 1.7 mm. long and 1.2 mm. broad, *Selenaspidus*-like in form, with a distinct articulation between the cephalothorax and abdomen, but there is no spur on the lateral margin. The integument becomes very densely chitinous at maturity, in which stage most of the pygidial characters are + obscured. The following particulars, therefore, are given from an adult ♀ prior to the stage of extreme chitination. The abdominal segments are distinctly indicated in the middle of the body but not at the margin. There are three well-defined regions at the margin; the cephalothorax, separated by a broad V-shaped indentation; the abdominal region; and less distinctly separated from the latter, the pygidium proper.

There is a marginal series of long (57μ) hairs at wide intervals, and a number of similar hairs scattered over both surfaces of the body. Parastigmatic glands present, 6–8 at the anterior spiracles. The pygidium (fig. 123) is broadly pointed and the pygidial area rather more highly chitinised than the remainder of the body. There are four pairs of lobes; L_1 , L_2 and L_3 strongly notched on their outer margins, L_4 rudimentary. The embossed area is large, coarsely reticulate. There are apparently no plates, and the paraphyses are chiefly represented by three pairs of thickened patches, which represent the clubs of the elongate thickenings that become conspicuous when the process of chitinisation has proceeded further. Spines long, as illustrated (fig. 123). Circumgenital glands 0.

Habitat: On trunk of large native tree (sp. indet., but probably baobab), Busi (near Beira); collected by C. Fuller.

Collection No.: 319.

105. ***Pseudaonidia clavigera***, Ckll. (Plate xii, fig. 125).

Pseudaonidia clavigera, Ckll., The Entom., xxxiv, p. 226, 1901; Marlatt, Proc. Ent. Soc. Wash., ix, p. 139, 1908.

Scale of adult ♀ broad oval to circular, about 2.5 mm. in longest diameter, completely covered by the outer layers of the host-plant stem, but with the brownish or resinous coloured exuviae faintly exposed. Seen from below when the scale is raised, it is flatly convex, brownish in colour.

Adult ♀, when mounted, large, about 2 mm. long, broadly rounded in front and pointed behind. The cephalothorax extends backwards one-third of the entire length and is deeply divided from the abdomen. The mouth-parts are comparatively very narrow, only occupying one-tenth of the width of the body. The abdominal segments are well defined, the two anterior ones united into a broad band, the third free segment narrow with the margins rounded. The whole body-wall is dense, and the reticulated area is well defined and distinct. The pygidium is pointed, and is made conspicuous by the two pairs of parallel thickenings with clubbed heads which extend from the margin into the pygidial area. Pygidium as illustrated (fig. 125). Circumgenital glands 0.

Habitat: On camellia, Durban; collected on several occasions by C. Fuller and A. Kelly.

Collection No.: 220.

106. ***Pseudaonidia laciniae***, sp. n. (Plate xii, fig. 128).

Scale of adult ♀ circular, about 1.5 mm. diameter, hemispherical, completely covered by the bark of the host-plant, through which the black exuviae show faintly. When raised and seen from below the scale is capsular, like a *Chrysomphalus*, with a ventral layer of dense black material like the dorsal scale. The inner wall of the scale is shiny black.

The adult ♀, when alive, is dark plum-coloured, with the pygidium brown. When mounted it is transparent, with the mouth-parts and reticulated area of the pygidium yellow. Mounted specimens generally contain large numbers of well-developed embryos. The body is about 1.5 mm. long, rounded in front and pointed behind.

The cephalothorax is flatly rounded in front, deeply separated from the abdomen, and occupies about two-fifths the length of the body. The abdominal segments are not so distinctly divided as in the majority of species in this genus.

Pygidium as illustrated (fig. 128). The reticulated area is not composed of large, well-developed areas as in many species, but gives one the impression rather of fat globules. There are indications of 4 pairs of lobes. L_1 close together, uniformly rounded as illustrated, or with outer edges more sloping and slightly notched; L_2 short; L_3 longer than L_2 , often rounded at apex, with outer edges sloping and once notched; L_4 similar to L_3 . Beyond these the margin is thickened and several times indentate. The first one or two projections might be looked upon as rudimentary lobes. The plates are thick, \pm parallel-sided, often curved towards their tips and hyaline. The formula would be $P_1, L_1, 2P_2, L_2, 3P_3, L_3, 3P_4, L_4, 1-3P_5$. The spines are short and stout. There is one on each surface of the pygidium between L_2 and L_3 , one between L_3 and L_4 , one between L_4 and P_5 , and one a little beyond the second projection. There are three pairs of divergent thickenings from the hind margin, furnished with separate \pm circular knobs. The outer pair are sometimes lacking, except for the knob, which is often \pm crescent-shaped (fig. 128). The anal opening is far back and appears to be protected by a pair of chitinous plates or a divided flap, which is very conspicuous and looks like a pair of lobes. Outside these the chitin is thickened and extends to the base of the median lobes as two pointed folds, the margins of which are wavy. Circumgenital glands 0.

Habitat: On stems of tree (*Acacia melanoxylon*?) growing in streets of East London; collected by C. P. Lounsbury, 1898 (Cape No. 1,248). On stems of *Acacia melanoxylon*, R. Br., Pietermaritzburg; collected by A. Kelly, 13th June 1915. These were associated with a very large flat *Lecanium* (sp. indet.).

Collection Nos. : 219, 219a.

107. ***Pseudaonidia glandulosa*** (Newst.) (Plate xii, fig. 122).

Aonidia glandulosa, Newst., Bull. Ent. Res., ii, pt. 2, p. 103, 1911.

Scale of adult ♀ elongate, very occasionally almost circular, about 1.25 to 1.5 mm. in diameter, white at first, sometimes faintly buff, with dark brown or resinous exuviae.

Puparium of ♂ similar but smaller, with pale exuviae.

The body of the adult ♀ is slightly conical and often appears to be situated in a shallow pit in the stem. It is small, about 0.9 mm. long, and about as wide as long (0.82). At maturity the body-wall is very densely chitinised and is brown or blackish brown when mounted. In immature specimens the body is hyaline, colourless, except the mouth-parts and pygidium, which are yellow. The most striking feature in mounted specimens is the presence of the two large transparent areas in the anterior portion of the body, which appear as two extremely large eye-spots (fig. 122). The cephalothorax is distinctly separated at the margin from the abdominal region; the anterior margin is flatly rounded from the level of the mouth-parts, where it suddenly slopes straightly inwards, so that at the articulation it is narrower than the abdomen. The segments are not distinctly produced; the anterior two are broad at the margin, but the third, posterior, is of about equal width in the centre but scarcely represented at the margin.

The pygidium is remarkable for its even, wavy or crenulate margin. There are two pairs of low lobes and very few plates in mature specimens, but before the integument has become densely chitinised the pygidium is exceptionally beautiful. There are then two pairs of well-defined lobes and indications of at least one other pair of rudimentary lobes, but the whole margin is so deeply crenulate and regularly supplied with gland openings that it is difficult to describe precisely otherwise than as lobulate. L_1 large, broadly rounded; L_2 about half as large, with the outer edge notched. The dorsal embossed area in this stage is faintly but distinctly noticeable, the thin areas reminding one of fat globules as seen under the microscope. There are seven or eight pairs of long spines at intervals from the second pair of lobes to the base of the pygidium. The ventral surface is longitudinally rugose and, near the margin, there are numerous gland openings with their long axes perpendicular to the margin. Of dorsal glands there are five well-defined series; the first, which is short and comprises about 6–7 glands, arises from the inside of the rudimentary L_3 ; the second, of 2–5 glands, reaches to the level of the vulva; the third, fourth and fifth do not appear to reach the margin and consist of about 20, 10 and 5 glands respectively. Pygidium of mature, fully chitinised specimen, as figured (fig. 122). Circumgenital glands 0.

Habitat: On *Acacia horrida*, Willd., Stellenbosch, C.P.; collected by T. F. Dreyer, 23rd May 1906. On *Acacia horrida*, Willd., associated with *Asterolecanium* from S.W. Africa, 1903 (Cape No. 1,137).

Collection Nos.: 218, 218a.

108. ***Pseudaonidia trilobitiformis*** (Green) (Plate xii, fig. 126).

Aspidiotus trilobitiformis, Green, Ind. Mus. Notes, iv, pt. 1, p. 4, 1896; id., Cocc. Ceylon, i, p. 41, 1896; d'Emmerez, Pr. Soc. Amic. Scien. p. 26, 1899.

Scale of adult ♀ large (may reach 4 mm. in diameter), flat, sometimes circular, but more often with one side flattened against a vein of a leaf. The colour is usually brown or reddish brown, but in old exposed specimens it is commonly more or less bleached. The exuviae are flat and usually yellowish to brownish. The form and colour of this scale are very similar to those of a typical *Selenaspidus* species.

“Adult female clear brown; surface hard and horny, polished, with numerous delicate transverse striated lines. Form oblong, rounded in front, tapering to a point behind; dorsal surface flattened; ventral surface slightly tumid; segments distinct and strongly defined; a deep transverse groove on dorsal surface between the prothoracic and mesothoracic segments; a large irregular depressed space on each side of rostrum, covered with white waxy secretion, marking the position of the parastigmatic glands, of which there is a group consisting of from 12 to 20 orifices in front of each of the anterior stigmata. Pygidium with eight prominent obscurely tricuspid lobes; mesal pair stoutest, but scarcely as long as second; others rather slender. Squames deeply fringed; two in the mesal and first spaces, and three in the second and third spaces between the lobes. Lateral margin of pygidium irregularly serrulate, with two deep notches marking the position of the obliterated second and third abdominal segments. On the dorsal surface is an extensive reticulated tract completely occupying the median area of the pygidium between the base and the anal aperture, the boundaries well defined and constant, the spaces

of irregular size and shape, crowded together, and forming a pattern not unlike that of crocodile leather. Circumgenital glands in four groups; orifices numerous, upper laterals with 21 to 24, lower laterals with 16 to 27; in every case the upper laterals contain the larger number of orifices; in one specimen were two single separate orifices in the place of an anterior median group. Tubular spinnerets of the filiform type, opening on the dorsal surface by large conspicuous pores arranged in definite linear series; the ducts themselves very delicate and difficult to trace. Similar pores and spinnerets on the other abdominal segments. Genital aperture between the lower lateral gland groups. Anal aperture about half-way between extremity and genital opening. Length, 1.50–1.80 mm. Breadth, about 4 mm." (Green).

Habitat: On litchi, Hillary, near Durban (probably imported from Mauritius), 5th December 1915.

Collection No.: 318.

109. ***Pseudaonidia lycii***, sp. n. (Plate xii, fig. 124).

Scale of adult ♀ about 1.6 mm. in diameter, \pm circular or somewhat elongate, moderately convex, sordid buff in colour, but usually obscured by the outer layers of bark of the host-plant. The exuviae are \pm central, covered, and dull yellow in rubbed specimens. The ventral scale is very delicate and remains attached to the host-plant.

Puparium of male somewhat similar but smaller, more elongate, and greyish white in colour. The exuviae are at the anterior end, slightly covered, yellowish.

Living material of this species has not been seen by the writer, so the following particulars refer to mounted specimens:—

Adult ♀ viviparous, about 1 mm. long. Anterior part of body strongly chitinised, brown in colour. Pygidium slightly so, yellow. Free abdominal segments delicate, hyaline. The front margin is regularly rounded, and smooth to the level of the mouth-parts, from whence, backwards, the lateral margin usually presents three broadly rounded undulations. The four free abdominal segments are slightly produced at the sides, where they are irregularly rounded, and each bears a number of marginal gland openings, several stout spines and a few hairs. The antennae consist of the usual very low tubercle, with two short, slightly curved spines. Anterior and posterior spiracles each with two anterior glands. The vulva is wide and situated at about the same level as the anal opening. The chitin from the pygidial margin to the vulva is coarsely rugose. The dorsal "embossed" area is not strongly chitinised and the design is only seen with difficulty. The pygidial characters, especially the character of the plates, indicate the position of this insect in the genus *Pseudaonidia* more strongly than would the faint dorsal patch. There are three pairs of well developed lobes, of which L_3 is low and broad, and often nearly or quite divided into two lobules; L_1 large, with margins crenulate, inner edges more steep than outer ones, apical part uniformly rounded; L_2 and L_3 also more steep on inner margins, crenulate; L_3 apparently made up of two similar lobules; all lobes slightly striated. P simple, \pm triangular or dagger-shaped. The spines at the bases of the lobes are strong (fig. 124). Circumgenital glands 0.

Formula: S, L_1 , S, L_2 , S, $3P_3$, L_3 (or 11_3), S, 5–7 P_4 .

Remarks: The scale of this species is somewhat like that of *A. canariensis*, Lindinger. The two species appear to show further similarities and closer relationship in the character of the gland openings, thick spines, and simple plates, but the lobes are entirely different, *canariensis* possessing but one pair. There is also a striking similarity between the pygidium of this species and the ♀ nymph of *Howardia silvestrii*, Leon., but the size is entirely different and the specimens I examined are undoubtedly adult.

Habitat: On *Lycium afrum*, Linn. (Solanaceae), Uitenhage; collected by C. P. Lounsbury, 1st August 1906 (Cape No. 1808).

Collection No.: 155.

110. ***Pseudaonidia nigra***, sp. n. (Plate xii, fig. 127).

Scale of adult ♀ almost circular, flat, about 2·8 mm. in diameter, black, sometimes with paler, brownish margins. Exuviae small, pushed to the extreme margin, appearing grey or brownish. In a few cases the position of the second exuvia is indicated by an indefinite greyish patch. The whole scale is beneath the epidermis of the leaf and appears as a black blister. For this reason it is not possible to remove the scale by rubbing, nor to pick it up with the nail as can generally be done. There is no indication of its presence on the lower side of the leaf. When the scale is broken open it is noticed that it is capsular, and that the inside is slightly dusted with white powdery wax.

The body of the ♀ is wine-red in colour. When cleared and mounted the ♀ is about 1·7 mm. long and 1·4 mm. broad, widest at about the middle, broadly rounded in front and tapering to the pygidial margin (fig. 127).

The pygidial margin, anterior to the serrated portion, is twice indented, each time having a conical, sharply pointed protuberance in front of it, from the bases of which arise short strong spines. There are four pairs of distinct, separate lobes, and beyond these the margin is strongly serrate, the first eight serrations on each side being almost as large as the lobes. The median lobes are close together, moderately strong, with both margins once strongly notched. L_2 about the same length as L_1 and L_3 , but much narrower than either of these; L_3 and L_4 similar in shape to L_1 , but slightly smaller and paler in colour. The plates are indistinct and appear to be simple, with blunt ends. There are four pairs of thickenings running into the pygidium; the inner pair, arising from between L_1 are the shortest and are slightly divergent and indistinctly thickened, not clubbed as are the other three pairs. The second pair, which arise between L_1 and L_2 are the longest and are distinctly clubbed. Pairs 3 and 4 are about equal in length and thickness (fig. 127).

The antennal tubercles are small, each with one moderately long seta and perhaps a short spur. Parastigmatic glands present, about 7–9 at each anterior spiracle.

Circumgenital glands present, arranged in the form of a horse-shoe but slightly interrupted in the middle, 17–23 on each side.

Remarks. The true "mining" habit of this species is not common in leaf species. In this respect this insect is very similar to *Aspidiotus subcuticularis*, Green, which lives on *Ficus* sp. in Northern Australia.

Habitat : On leaves of an undetermined plant, Durban ; collected by C. P. v. d. Merwe, August 1st 1916.

Collection No. : 257.

Genus **Parlatoorea**, Targ.

In this genus the scale of the adult ♀ is variable in form and may be \pm subcircular, ovoid, or elongate. The insects bear a somewhat superficial resemblance to *Fiorinia* owing to the large, usually hardened skin of the second stage, which in *Parlatoorea*, however, does not enclose the adult ♀, but merely covers it.

The most striking generic character is found in the pygidium of the adult ♀, in which there are three pairs of tri-lobed lobes and a rudimentary fourth lobe, which is tooth-like in *P. pergandei* and *zizyphi* and plate-like in *P. proteus* ; a fringe of finely toothed plates between them, and a series of thick-walled marginal glands which open by broad mouths placed parallel to the body margin.

The puparium of the ♂ is oblong, non-carinated, and rather narrow, with the larval exuviae placed at the anterior extremity.

So far as I can ascertain, we have only three species in this country, all of which have been introduced. These may be distinguished as follows :—

Scale of adult ♀ black, \pm rectangular with rounded corners ; rudimentary lobe (4th) \pm tooth-like, usually pointed ; dorsal gland-pores numerous.

P. zizyphi.

Scale of adult ♀ semi-transparent, \pm circular or pear-shaped ; rudimentary lobe (4th) as in *zizyphi* ; few dorsal gland-pores *P. pergandei*.

Scale of adult ♀ yellowish, \pm egg-shaped : rudimentary lobe (4th) plate-like ; few dorsal gland-pores *P. proteus*.

111. **Parlatoorea pergandei**, Comst. (Plate xiii, fig. 130).

Parlatoria pergandii, Comst., Rep. U.S. Dept. Agr., p. 327, 1881 ; Newst., Mon. Brit. Cocc., i, p. 143, 1901 ; Fernald, Catalogue, p. 319, 1903.

Scale of adult ♀ about 1 to 1.75 mm. long, very variable in shape, roundish to broad pear-shaped, or sometimes \pm elongate, thin, semi-transparent, smooth, the sub-lying ♀ being partly visible, smoky-white with a brownish streak and with marginal, yellowish- or orange-brown exuviae. Ventral scale complete, whitish.

The puparium of the ♂ is similar in shape to that of *P. proteus*, smoky brown to purplish brown behind the exuviae, and with the larval exuviae yellowish or straw-coloured.

When mounted the body of the adult ♀ is entirely hyaline, small, about 0.75 mm. long, broadest slightly behind the middle. The anterior part is flatly rounded and bears a small tubercle on each side at the level of the front portion of the mouth-parts. The abdominal segments are broadly rounded and wider than the cephalothorax. On their margins are a number of remarkable glandular protuberances. The antennal tubercles are flat, with one long curved spine. Parastigmatic glands 0. The pygidium is characterised by its regular, rounded appearance, with the large marginal glands, whose openings are at right angles to the long axis of the body,

the broadly-trilobed L_1 , L_2 and L_3 , and the fringe of broad fimbriated plates; L_4 is small, sharply pointed (fig. 130). Circumgenital glands in 4 groups:—

6—10 6—10

6—8 6—8

Formula: P_1 , L_1 , $2P_2$, L_2 , $3P_3$, L_3 , $3P_4$, L_4 , $3P_5$.

Habitat: On croton, Grahamstown; collected by A. Kelly, March 1915. Also at Cape Town, Port Elizabeth, Durban, Johannesburg and Pretoria (in greenhouses).

Collection No.: 281.

112. **Parlatoria proteus** (Curtis) (Plate xiii, fig. 129).

Aspidiotus proteus, Curt., Gard. Chron., p. 676, 1843.

Diaspis parlatoris, Targ., Studii sul. Cocc., p. 14, 1867.

Parlatoria proteus, Sign., Ann. Soc. Ent. France, (4) ix, p. 450, 1869; Newst.,

Mon. Brit. Cocc., i, p. 140, 1901; Fernald, Catalogue, p. 320, 1903.

Scale of adult ♀ about 1·2 to 2 mm. long, \pm egg-shaped, yellowish, greyish or greenish yellow, with exuviae at the anterior extremity yellowish or brownish. The second exuviae in this species are not nearly so large in comparison as those of *P. zizyphi*, neither are they so rectangular or black.

The puparium of the ♂ is very elongate, with parallel sides, flatly convex until the adult emerges, when the central part becomes sunken. The secreted portion is dull, pale, with yellow exuviae, which often show a greenish dorsal area.

The adult ♀, when mounted, is small, about 0·75 mm. long, almost circular or slightly egg-shaped, widest at the free abdominal segments, hyaline, with a short, stout spine on the lateral margin of the cephalothorax nearer to the articulation than in *pergandei*. The lobes are longer and comparatively narrower than those of *pergandei*, and L_4 is represented by a plate (fig. 129). Circumgenital glands in 4 groups:—

5—7 5—7

4—6 4—6

Formula: P_1 , L_1 , $2P_2$, L_2 , $3P_3$, L_3 , $7P_4$.

The middle plate of the $7P_4$ is small and rounded and has a spine at its outer edge. This represents the rudimentary L_4 of the other species.

Habitat: On orchid, Natal Coast; collected by C. Fuller.

Collection No.: 282.

113. **Parlatoria zizyphi** (Lucas) Sign. (Plate xiii, fig. 131).

Coccus zizyphus, Lucas, Bull. Soc. Ent. France, (3) i, p. 28, 1853.

Chermes aurantii, Bdv., Ent. Hort., p. 338, 1867.

Parlatoria lucasii, Targ., Catalogue, p. 42, 1869.

Parlatoria zizyphi, Sign., Ann. Soc. Ent. France, (4) ix, p. 451, 1869; Fuller,

Notes on Cocc. W. Austr., pp. 4, 13, 1897; Newst. Mon. Brit. Cocc. i, p. 148, 1901.

Parlatoria zizyphus, Fernald, Catalogue, p. 322, 1903.

Parlatoria zizyphi, Lindinger, Die Schildläuse, p. 108, 1912.

The scale of the adult ♀ is about 1.4 to 2 mm. long, flat, composed almost entirely of the opaque black, hardened skin of the second stage and supplemented by a thin whitish or brownish secretion, which is most conspicuous behind. The shape therefore is \pm rectangular with rounded corners, that of the 2nd exuviae with the larval exuviae extending for half its length in front and often turned to one side, opaque black. Ventral scale complete, whitish or brownish.

The puparium of the ♂ is elongate, whitish or brownish, with larval exuviae black.

The adult ♀, when mounted, is small, hyaline, readily distinguished from *P. proteus* and *pergandei* by the following particulars (fig. 131):—The margin of the cephalothorax, near the articulation, bears a *large* rounded tubercle, marginal tubercle of the abdominal segments numerous and comparatively long; L_1 , L_2 and L_3 long, narrow, trilobed; L_4 pointed as in *P. pergandei*, but better developed. Circumgenital glands in 4 groups:—

6—7 6—7

7—10 7—10

Formula: P_1 , L_1 , $2P_2$, L_2 , $3P_3$, L_3 , $3P_4$, L_4 , 4–5 P_5 .

L_4 in this species may be small and pointed as in *P. pergandei* or \pm lobe-like.

Habitat: On orange, Durban and Port Elizabeth; collected by C. P. Lounsbury.

Collection No.: 283.

Genus **Aonidia**, Targ.

The genus *Aonidia* shows relationship with both *Aspidiotus* and *Parlatorea*. The second stages of some species show characters that seem to be intermediate between the two. It differs from both of these, however, in the fact that the adult ♀ is entirely enclosed within the large, hardened skin of the second stage. As is usual in cases where the second stage becomes large and hardened the dorsal scale, *i.e.*, secreted portion, is \pm transparent and scant, but firm and resistant. The first exuviae are \pm central. The adult ♀ is generally viviparous and without circumgenital glands, differing from that of *Gymnaspis* chiefly in the fact that the pygidium is more highly developed and possesses definite lobes and plates.

The puparium of the ♂ is somewhat similar to the scale of the female in size and shape, or, in some cases, rather elongate, and consists of secretory matter with the larval exuviae at or near the centre.

114. **Aonidia simplex**, Leon. (Plate xiv, fig. 135).

Aonidia simplex, Leon., Boll. Lab. Zool. Portici, p. 209, 1914.

Scale of adult ♀ about 1.2 mm. long, buff, \pm irregular oval, moderately convex, with yellowish or orange exuviae when young. When full-grown the colour is determined by the hardened skin of the second stage ♀, which is rich chestnut-brown. In this stage the dorsal scale is scant and appears whitish or greyish. The ventral scale is robust, whitish or greyish.

The puparium of the ♂ is more slender than the ♀ scale, buff, with paler margins; exuviae yellow or orange.

Second exuviae, which enclose the adult ♀, broad pear-shaped, about 1 mm. long and 0·7 mm. broad. They are moderately chitinised and yellow-brown when cleared. The pygidium is as illustrated in Fig. 135. The adult ♀ is smaller, about 0·8 mm. long, and 0·55 mm. broad, \pm hyaline.

Habitat : On the leaves of a native plant (*Ehretia hottentottica*), Pretoria ; collected by the writer, 3rd July 1915.

Collection No. : 255.

115. **Aonidia chaetachmeae**, sp. n. (Plate xiv, fig. 134).

Scale of adult ♀ small, about 1 mm. long, \pm pyriform, with irregularly crenulate edges, dull pitch black in colour, with a scanty white layer of waxy secretion, which is most noticeable around the margins. The larval exuviae are central, raised, black, with dark brown margins. The hard, black, second stage skin is moderately convex, and in some cases the crinkled margins give them a shell-like appearance. The pygidial margin is often rich brown instead of black.

The puparium of the ♂ is rather elongate, about as long as the ♀ scale but with sides more parallel, buff-coloured, translucent, with exuviae nearer the anterior end. The posterior portion of the secreted substance is paler in colour. The larval exuviae are of the same size as those of the female scales, black, with brown margins. The second exuviae, which enclose the adult ♀, are very dense, blackish brown when boiled in KOH and cleared. These have a remarkable shape, with the whole margin thickened and broadly crenulate or scalloped, and with the lateral margins of the pygidial area parallel. This gives the appearance of the hind extremity being sharply cut off, as the posterior margin is more delicate. The adult ♀ is about 0·7 mm. long, broadest at about the level of the mouth-parts and tapering acutely to the pygidium. The antennal tubercles are small, with one long, curved, spine. Parastigmatic glands 0. The pygidium has two pairs of well-developed lobes. L_1 large, with the inner margins parallel, notched on each margin ; L_2 smaller, close to L_1 , steep on inner side and sloping outer edge. Spines, etc., as illustrated (fig. 134). Circumgenital glands 0.

Habitat : On "umkavoti" (*Chaetachme aristata*, Planch.), Durban ; collected by C. Fuller, 12th October 1914.

Collection No. : 286.

116. **Aonidia rhusae**, sp. n. (Plate xiv, fig. 137).

Scale of adult ♀ about 1·5 mm. long, brown, or blackish brown, owing to the black second stage skin showing through the brownish dorsal scale. The dorsal scale is comparatively large and robust, brownish in colour, probably from the admixture of epidermal tissues. Exuviae central, dark brown.

The puparium of the male is almost circular to elongate oval, somewhat conical, smooth, parchment-like, buff, or brownish with dark brown central exuviae.

Female, second stage, from the second exuviae which enclose the adult ♀, elongate, about 1·3 mm. long, and 0·8 mm. broad, highly chitinised, brown, with the median portion blackish. It is broadly rounded in front, widest at about the middle and

tapering to the hind margin, which is pointed. The margin is broadly crenulate, indicating nine regions or segments, of which the fourth from the front is the widest. The pygidial margin as illustrated (fig. 137).

The adult ♀ is about 1 mm. long, long pear-shaped, hyaline, sharply tapering behind. The antennal tubercles are small, conspicuous, with one long, straight flagellum. Parastigmatic glands 0. The pygidium has two pairs of lobes; L_1 are long and straightly notched on each side; L_2 much smaller, often slightly notched on the outer side, but in some cases quite rudimentary. Circumgenital glands 0.

Habitat: On *Rhus* sp., Cape Town; collected by C. Fuller, 1898 (Cape No. 1251).

Collection No.: 289.

117. **Aonidia mesembryanthemae**, sp. n., (Plate xiv, fig. 136).

Insects making pits in the fleshy leaves of the host-plant, around which the tissues often thicken to form rounded mounds with the scale in the central depression.

The dorsal scale of the adult ♀ is about 1.5 mm. long and 1 mm. broad, white, thin, translucent, very delicate, with the buff-coloured larval exuviae central. As the second stage ♀ develops it appears as a dark brown to black mass beneath the dorsal scale, with paler margins, ultimately reaching approximately the size of the dorsal scale. At this stage the scale appears black or greyish black, according to whether the delicate dorsal scale persists or not.

Adult ♀ pale yellow, broadly rounded, with very narrow pygidium. Posterior portion of body conical, filling the depression below the scale. Adult ♀ apparently *not* enclosed in the second exuviae, but completely covered by them. Ventral scale complete but very delicate, white.

The puparium of the ♂ is about 1 mm. long, slightly more elongate and more convex than the female scale, white to buff in colour, with yellowish larval exuviae.

The second stage ♀ attains a length of 1.3 mm. and a width of 0.9 mm. The integument becomes densely chitinous and dark brown to black. When boiled in KOH and mounted the margins are light in colour, almost hyaline, but the median area is deep brown. The margins are more regular than in any of the other five species found in this country, and the body is more regularly egg-shaped. The pygidium is delicate, and scarcely produced from the general body outline. Segmentation obscure. The pygidial characters are illustrated with those of the adult ♀ (fig. 136).

The adult ♀ is smaller, about 1.8 mm. long, pear-shaped, with the posterior extremity pointed. The whole body is delicate and hyaline when mounted. The pygidial characters as illustrated (fig. 136). Circumgenital glands 0.

Habitat: Making pits in the fleshy leaves of *Mesembryanthemum edule*, Natal Coast, Cape Province, etc.

Collection No.: 290.

118. **Aonidia marginalis**, sp. n. (Plate xiv, fig. 138).

Scale of adult ♀ about 1.5 mm. long, composed of large second exuviae, with a thin layer of buff-coloured secretion. Exuviae often showing through, black.

The shape of the scale is broad, pear-shaped, much arched, broadly rounded in front and suddenly narrowed a little behind the middle. The secretory covering easily flakes off and exposes the dense second skin, which is dull black, except the margins and pygidial area which are deep red. When cleared and mounted the second stage varies in length from 0.9 mm. to 1.5 mm. It is clear at the margins and deep yellow to almost black in the centre, according to the degree of chitinisation. It is broad oval, with the delicate pygidium protruding from the hind end.

The adult ♀, as seen within the second skin, is almost as long and broad, but becomes narrower towards the pygidial extremity. The pygidial characters of both second stage and adult ♀ are illustrated in fig. 138. The anal opening is small, situated about twice the length of L_1 from the margin; the vulva is broad oval, rather more than twice as far back. Circumgenital glands 0.

Habitat: On *Rhus*, in association with *Aonidia badia*, sp. n. On stems of *Rhus* sp., Zeerust, Tvl., May 1915; collected by A. Kelly.

Collection No.: 292.

119. *Aonidia badia*, sp. n. (Plate xiv, fig. 139).

Insect making pits in the thin stems of *Rhus* sp.

Scale of adult ♀ almost circular, flat, about 1.2 mm. in diameter, consisting of the thickened second stage *plus* a very thin, transparent layer of secretion, which is only noticeable where it projects at the margins.

The second stage ♀ is light chestnut-coloured. First exuviae present as a small concolorous prominence near the anterior margin of the otherwise flat scale. When the scale is removed it is found to be somewhat roundly convex below, completely filling a circular depression in the bark, the scale usually lying flush with the surrounding tissue on the top. The second stage ♀ appears circular, and is uniformly chitinous to the position of the pygidial segments, where it is flatly concave. The pygidium itself is not dense and is very inconspicuous until the specimens are mounted; it is often missing, because of its delicate nature, and when present, the lobes and plates are often broken. Its typical characters are shown in fig. 139.

The adult ♀ is entirely enclosed in the second stage skin, but mounted specimens have occasionally shown the pygidium of the adult ♀ protruding beyond the split hind margin of the enclosing exuviae. The body is about 0.8 mm. long, and 0.7 mm. wide, broadly rounded, hyaline, suddenly narrowed to the two last free abdominal segments and with the pygidium narrow and pointed. The antennal tubercles are large, with one very stout spine and a short, finger-like protuberance. Parastigmatic glands 0. The pygidial margin has two pairs of well-developed lobes; L_1 large, long, tapering to the tip and once notched on the outer sides; L_2 small, steep on inner sides, but sloping backwards, with the curve of the margin on the outer edge. The spines are a little longer than L_1 , and distributed as shown in fig. 139. The two conspicuous marginal openings have slightly thickened edges, reminding one of *Diaspidiotus*. Circumgenital glands 0.

Habitat: On twigs of *Rhus* sp., Kenilworth, C.P.; collected by the writer, August 1914. Also on *Rhus* sp. in association with *Aonidia marginalis*, sp. n., at Zeerust, Tvl.; collected by A. Kelly, 29th May 1915.

Collection No.: 291.

Genus **Gymnaspis**, Newst.

Scale of the adult ♀ variable, but most often reminding one of that of *Aonidia*, consisting chiefly or entirely of the black hardened second stage skin. In some cases, at maturity, the dorsal scale and first exuviae are lost, so that these hardened skins remain naked. The adult ♀ remains enclosed in this hardened cyst-like skin. In one Brazilian species (*Gymnaspis aberemoae*), described by Lindinger in 1910, there is a definite dorsal scale much like the second stage of some of the *Selenaspidus* spp.

The second stage female in *Gymnaspis* has lobes and plates, but in the adult ♀ the pygidium is rudimentary and is not provided with definite lobes or plates, but usually has ordinary spines or protuberances which are either teat-like or bottle-shaped.

It is usual for the adult ♀ to be viviparous and without circumgenital glands, but *G. aberemoae* is apparently an exception to this rule.

The males of only a few of the small number of species of *Gymnaspis* are known.

120. **Gymnaspis faurei**, sp. n. (Plate xiv, fig. 140).

Scale of adult ♀ consisting entirely of the hard, thickened, dull black second stage skin, with a thin, but hard covering, which is black and dense below and greyish and flaky above. Larval exuviae generally absent; when present, as in younger specimens, black. Skin of second stage about 1 mm. to 1.2 mm. in length, rather longer than broad and moderately convex.

The body of the second stage ♀ becomes very hard and is dull black. Even after soaking in hot KOH for hours it is entirely piceous, except the two median lobes, when they persist, and these are brown. In shape the body is broad pear-shaped, but very irregular at the anterior end. The pygidium and free abdominal segments are more constant in form. The latter are prominently rounded and bear a few stout conical projections. The characters of the posterior margin of the pygidium are illustrated in fig. 140.

The adult ♀, when mounted, often contains several well-developed larvae. The body is long, somewhat oblong in front and suddenly narrowed to the hind extremity. Segmentation is not pronounced at the margin, but a few segments are strongly indicated in the abdominal region. The pygidium is very simple, without lobes or plates, but with a few very strong stout spines. The chitin is often thickened at the extreme margin and much wrinkled posterior to the vulva, which is very wide. Its characters are illustrated in fig. 140. Circumgenital glands 0.

Habitat: Clustered on stems of "karree" bush (*Rhus* sp.), Bloemfontein, O.F.S.; collected by J. C. Faure, November 1914.

I have pleasure in associating Mr. Faure's name with this interesting species.

Collection No.: 288.

Genus **Howardia**, Berl. & Leon.

Scale of adult ♀ \pm oval to elongate, with the exuviae at or near one margin of the scale. Scale usually \pm covered by the outer layers of the bark of the host-plant. Pygidium with median lobes well developed and with a pair of usually clubbed paraphyses. Circumgenital glands usually absent.

121. **Howardia biclavis** (Comst.) (Plate xiii, fig. 133).

Chionaspis (?) *biclavis*, Comst., Second Rept. Dept. Agr. Cornell Univ. p. 98, 1883.

Aspidiotus theae, Green, Insect Pests, p. 13, 1890 (♀ only).

Chionaspis biclavis, Craw, Rept. Cal. Bd. Hort. p. 14, 1891

Howardia biclavis, Berl. & Leon., Riv. Pat. Veg. iv, p. 348, 1896.

Chionaspis biclavis, Green, Cocc. Ceylon, ii, p. 152, 1899; Newst., Mon. Brit. Coccidae, i, p. 190, 1901.

The original description by Comstock (l.c.), omitting figure references, is as follows:—

“ This species, of which only the female is known, is remarkable on account of its habit of burrowing beneath the epidermal layer of the leaf or twig which it infests. The color of the scale is white; but this color is almost invariably obscured by the layer of vegetable tissue beneath which the scale is, and which adheres closely to the scale. . . .

“ Scale of female.—The scale of the female is very nearly circular. On this account I place the species in this genus only provisionally, until the scale of the male is found. The exuviae are marginal and project beyond the edge of the scale, giving the whole scale more nearly the form of *Chionaspis* than of any other known genus.

“ Female.—The characters presented by the last segment of the female are as unusual as those presented by the scale. The pores on the dorsal surface of the segment are very small. Scattered over the ventral surface are numerous minute spines. The groups of spinnerets are wanting.

“ The mesal lobes are large, oblique; nearly twice as broad as long; approximate at the base; the mesal margins diverge slightly; distal margin serrate; meso-distal angle rounded and produced into a lobule. The second lobe is very small, being simply an angular projection of the body-wall. The third lobe is about three times as wide as the second lobe, but it projects only a little beyond the margin of the segment.

“ The plates are simple and spine-like. There are two minute ones between mesal lobes; two between first and second lobes; two or three between second and third lobes; a group of three or four larger ones laterad of third lobe; and another group of four or five still larger ones about midway between this group and the penultimate segment. Each of the three segments preceding the last bears on each lateral margin about seven plates.

“ Two spines accompany each group of plates, one on the dorsal surface and one on the ventral. The first and second spines of each side are very small; the third, which is between the second and third lobes, is the largest; the fourth and fifth are successively smaller.

"There are two conspicuous club-shaped organs which appear like thickenings of the body-wall, but which are really within the body cephalad of the mesal lobes. These organs are about three times as long as the mesal lobes; they converge caudad; and the cephalic end of each is suddenly enlarged. This species may be distinguished from any other known American Coccid by the presence of these organs."

Habitat: In Durban only on the following plants:—*Durantea* sp., *Trichelia* sp., *Raphiolepis* spp., star apple, *Poinsettia*, *Bignonia* sp., *Bauhinia* sp., honeysuckle and privet.

Collection No.: 214.

122. **Howardia moorsi** (Doane & Ferris) (Plate xiii, fig. 132).

Lepidosaphes moorsi, Doane & Ferris, Bull. Ent. Res., vi, pt. 4, p. 401, 1916.

Scales of adult ♀ entirely covered by the outer layers of bark, very long (3–4 mm.), moderately broad (0·8–1 mm.), almost parallel-sided, with the hind extremity broadly rounded and the anterior end tapering; pale, translucent brown to deep chitin brown, with thinner paler margins. The scale is flatly arched and looks like a low burrow. It is horn-like in texture and very large in comparison to the size of the body of the adult ♀. The whole horny scale—which is easily broken—is often completely covered above by a whitish layer of waxy material, with which is incorporated fragments of the loose bark of the host-plant. It is most often straight, but occasionally much curved. I am uncertain as to the colour of the exuviae, as the whole character of the material is indefinite and I possess only two small stems representing one collection of material. These bear many specimens, as they are more or less densely covered, but the scales are so inconspicuous that it is difficult to detect their presence.

Male puparium not observed.

Second stage ♀ with chitinous thickenings from median lobes similar to adult.

Body of adult ♀ elongate, broadest behind middle, front margin entire, broadly rounded, abdominal segments not produced. The pygidium has one pair of lobes, which are chitinous, with the margins very finely serrate. The other characters of the pygidium as illustrated (fig. 132). Circumgenital glands in 5 groups, with the median and anterior groups \pm united into a bow.

4—6	
6	6
4	4

Remarks. This species exhibits several remarkable characters; so much so that I am by no means certain that it belongs to the genus *Howardia* at all. The elongate, burrow-like scale is unusual, but the powerful median lobes and strong chitinous projections into the pygidium are sufficient to warrant its inclusion in this genus.

Habitat: On stems of Pride of India (*Lagerstroemia indica*), in the Botanic Gardens, Durban; collected by A. Kelly, 31st March 1915.

Collection No.: 264.

Genus **Fiorinia**, Targ.

The scale of the adult ♀ is generally extremely thin and transparent, revealing the large, hardened, second stage skin, which entirely encloses the adult ♀. The colour of the scale is thus determined chiefly by the colour of the dry second stage skin.

The adult ♀ is smaller than the enveloping skin, and gradually shrinks as eggs or young are deposited within the same hardened case.

123. **Fiorinia fioriniae** (Targ.) (Plate xiv, fig. 141).

Diaspis fioriniae, Targ., *Studii sul Cocciniglie*, p. 14, 1867.

Chermes arecae, Boisd., *Insectologie Agricole*, p. 262, 1868.

Fiorinia pellucida, Targ., *Catalogue*, p. 42, 1869.

Fiorinia camelliae, Comst., *Rept. U.S. Dept Agr.*, 1880, p. 329, 1881.

Uhlaria fioriniae, Comst., *Second Rept. Dept. Ent. Cornell Univ.*, p. 111, 1883.

Fiorinia camelliae, Mask., *N.Z. Trans.*, xxiv, p. 16, 1891.

Fiorinia fioriniae, Ckll., *Can. Ent.*, xxvi, p. 33, 1894.

Fiorinia palmae, Green, *Ind. Mus. Notes*, iv, p. 5, 1896.

Fiorinia fioriniae, Green, *Cocc. Ceylon*, i, p. 94, 1896; Newst., *Mon. Brit. Cocc.*, i, p. 134, 1901; Sasser, *Bull. U.S. Dept. Agr. T.S.*, 16, v, p. 79, 1912.

Scale of adult ♀ about 1.25 mm. long and 0.5 mm. broad, consisting almost entirely of the second pellicle covered by a thin transparent layer of colourless secretion, which extends slightly beyond its margin. Colour of the second pellicle varying from orange-yellow to rich reddish-brown. The median line is generally somewhat raised into a rounded longitudinal ridge, which appears darker. The first exuviae are small, pale in colour, and extend beyond the margin of the anterior extremity.

Male puparium white, about 1 mm. long and 0.4 mm. broad, straight, distinctly tricarinate, with pale yellow exuviae.

Adult ♀ dull orange-yellow in colour, at first elongate, later with abdominal segments somewhat retracted.

“Female thin and much contracted after oviposition, elongate, possessing rudimentary antennae, which are apparently two-jointed, the first consisting of a fleshy tubercle, which bears the second joint and a bristle, the second joint occasionally possessing a short lateral branch near the tip; anal plate triangular, 0.187 to 0.204 mm. in width, slightly truncate at tip, median notch distinct and formed by the median lobes, which are oblique and serrated along their entire free edge; second lobes prominent both in second larval exuviae and adult, incised, about twice as long as broad and followed by several indentations; margin of the pygidium exhibiting four rather conspicuous tubular pores; between the median lobes are two short spines; located on the dorsal surface situated along the lateral margin of the median lobe there are two spines, the posterior being the larger, one on the outer lobule of the second lobe and two situated between the second lobe and the penultimate segment; on ventral surface there is a spine corresponding with each dorsal spine, except on the first lobe; laterad of each lobe there is an elongate pore and two between the second lobule and the penultimate segment; anal opening

twice the width of one median lobe and far removed from the tip; median and anterior lateral paragenitals contiguous, forming an arch, 21 to 23 posterior laterals 10 to 16." (Sasscer).

Habitat: On camellia and palms. Fairly common throughout the Union.

Collection No.: 187.

Genus **Diaspis**, Costa.

Scale of adult ♀ circular or nearly so, with the exuviae usually situated towards one side but entirely within the margin, occasionally almost central. Ventral scale usually delicate. The ♂ puparium differs in form and texture from that of the ♀ scale and is generally elongate, parallel-sided, small, white, and often tricarinate. This genus is readily distinguished from *Aspidiotus* by the different form of the male. The species included by some writers in the genus *Aulacaspis* seem to indicate a connecting link with insects of the *Chionaspis* type, with which *Diaspis* seems to be closely related. On the other hand insects included in the sub-genus *Epidiaspis* form a natural link with *Aspidiotus* through the sub-genus *Diaspidiotus*. These three sub-genera may be distinguished as follows:—

A. Pygidium with club-shaped glands, reminding one of *Diaspidiotus*.

1. Dorsal glands in single rows, small inconspicuous *Epidiaspis*.

B. Pygidium without club-shaped glands.

2. Dorsal glands appearing irregularly disposed *Diaspis*, s. str.

3. Dorsal glands in regular rows *Aulacaspis*.

124. **Diaspis bromeliae** (Kerner) Sign. (Plate xv, fig. 143).

Coccus bromeliae, Kerner, Naturg. pp. 20, 52, 1778.

Chermes bromeliae, Bdv., Ent. Hort. p. 334, 1867.

Diaspis bromeliae, Sign., Ann. Soc. Ent. France, (4) ix, p. 434, 1869.

Aulacaspis bromeliae, Ckll., Can. Ent. xxvi, p. 33, 1894.

Diaspis bromeliae, Newst., Mon. Brit. Cocc. i, p. 156, 1901; Lindinger, Die Schildläuse, p. 66, 1912.

Scale of adult ♀ about 2.2–3 mm. in diameter, flat or slightly convex, ± circular, thin, ± transparent, yellowish or greenish in colour. Exuviae almost central in many specimens, but occasionally near one margin, dark yellow to pale brown.

Adult ♀, when mounted, about 0.8 mm. long and 0.6 mm. broad, moderately elongate, hyaline, with the abdominal segments moderately produced at the margins. The pygidial margin (fig. 143) has three pairs of lobes; L_1 largest, divergent, with their inner margin finely serrate and their distal extremities rounded; L_2 and L_3 each composed of two sub-equal lobules, whose distal edges are flatly rounded. Outside L_3 there is a spine and a dagger-shaped spine and beyond this what may be considered as a rudimentary L_4 . About half-way up the pygidial margin there is a large gland-pore opening into a pointed process whose point turns slightly outward from the body; in some cases it is dense and appears as a stout strong spur. Circumgenital glands in 5 groups:—

7—11

13—21 13—21

12—18 12—18

Habitat: On pineapple, Natal, and Newlands, C.P.; collected by C. Fuller and C. P. Lounsbury, 1898. Occasionally found in greenhouses at Kingwilliamstown and Pretoria.

Collection No.: 153.

125. ***Diaspis boisduvali***, Sign.

Diaspis boisduvalii, Sign., Ann. Soc. Ent. France, (4) ix, p. 432, 1869.

Aulacaspis boisduvalii, Ckll., Gard. Chron. (3) xiii, p. 548, 1893.

Diaspis boisduvalii, Newst., Mon. Brit. Cocc., i, p. 153, 1901.

Diaspis boisduvali, Lndgr., Die Schildläuse, p. 75, 1912.

Scale of adult ♀ 1.3–2.2 mm. in diameter, circular or broad egg-shaped, flatly convex, thin, transparent, greenish yellow. Exuviae central or nearly so, usually pale yellow, but more seldom brownish yellow.

The body of the adult ♀ is broad egg-shaped, with narrowed pygidium, pale yellow. The anterior margin in mounted specimens is flatly rounded, with a broadly rounded, prominent tubercle on each side of the thoracic segment. This character alone forms a ready means of distinguishing this species from *D. bromeliae*, which is otherwise very similar. The pygidium is similar to that of *D. bromeliae*, but the lobes are slightly stronger, the dorsal glands are small and fewer in number, and the gland openings are shorter. The circumgenital glands are in 5 groups:—

$$\begin{array}{cc} & 4-12 \\ 11-25 & 11-25 \\ 7-20 & 7-20 \end{array}$$

Habitat: On Maranta, Durban; collected by A. Kelly. On palm, Pretoria, and on orchid, Pietermaritzburg.

Collection Nos.: 153a–153c.

126. ***Diaspis echinocacti*** (Bouché) (Plate xv, fig. 142).

Aspidiotus echinocacti, Bouché, Schadl. Gart. Ins. p. 53, 1833.

Diaspis calyptroides, Costa, Faun. Red. Nap. Cocc., p. 201, 835; Sign., Ann. Soc. Ent. France, (4) ix, pp. 99, 434, 1869; Newst., Mon. Brit. Coccidae, i, p. 159, 1901.

Scale of adult ♀ about 2.5 mm. in diameter, almost circular, convex, opaque white when young, or sometimes slightly translucent and appearing yellowish or greenish, with \pm subcentral exuviae, which vary from yellowish brown to blackish brown. Old ♀ scales buff in colour, with white margin and dark brown exuviae.

Puparium of ♂ about 1.5 mm. long, narrow, yellow-buff with pale yellow-brown exuviae. The secreted portion is semi-translucent, with a distinct median keel.

Living ♀ yellow. Body of adult ♀, when mounted, broad pear-shaped, regularly rounded in front, thin, transparent and hyaline, with the mouth-parts, spiracles and pygidium slightly yellow. Abdominal segments not strongly produced, the posterior two rounded, and supplied with glands and a few hairs and plates.

Antennae consisting of low tubercles, each with one comparatively curved spine. Parastigmatic glands few in number, usually 2 or 3 at each anterior spiracle. Circumgenital glands in 5 distinct groups :—

9—14

12—23 12—23

11—20 11—20

Adult ♂♂ were emerging from material received from Pearston, C.P., 27th May 1916.

Adult ♂ deep orange in colour, with legs and antennae and posterior portion of abdomen paler. The wings are cloudy white and slightly iridescent. The genital sheath is very long, the comparative measurements being :—

Length of body, without antennae or spike	..	..	..	..	..	6 mm.
Width of body	..	..	..	..	..	2 „
Length of wings	..	..	..	..	..	78 „
Length of antennae	..	..	..	..	..	64 „
Length of genital spike	..	..	..	..	..	26 „

The antennae are 10-jointed, the two basal joints very short and together forming a \pm globular tubercle; the remaining 8 \pm subequal, and supplied with the usual hairs.

Remarks. A recent report from Mr. Palmer of Pearston, C.P., that this species is killing off his Burbank prickly pears reminds me of a fact mentioned by Mr. Lounsbury that years ago single leaves heavily encrusted with *D. echinocacti* were sold at two shillings each to infest plants in other localities and so kill off the host-plant.

Habitat : On *Opuntia* sp., Graaff Reinet and Pearston, C.P. (Cape Accession No. 1622).

Collection No. : 156.

127. *Diaspis newsteadi*, Leonardi (Plate xxv, fig. 147).

Diaspis newsteadi, Leonardi, Boll. Lab. Zool. Portici, p. 190, 1914.

Scale of adult ♀ large, to 2.6 mm. diameter, almost circular to somewhat elongate, very convex, rounded or \pm conical, white, with the sulphur-yellow exuviae forming a distinct cap at or near centre of scale. In old specimens the second exuviae are dark, often grey in colour, in which case they are generally surmounted by a small yellow prominence which represents the first exuviae. The secretory portion of the scale is compact and dense and often has its white colour obscured by fragments of the reddish bark of its host-plant. The ♀ scales are often clustered on the stems of the host-plant in enormous numbers.

Puparium of ♂ comparatively large, white, non-carinate, with bright exuviae. The male puparia are clustered together, usually away from the ♀ and generally project from the stem amidst a large collection of fluffy white secretion.

The colour of the adult ♀ and of the ova is pale lemon or sulphur-yellow. Body broadly oval, not much narrowed to the pygidium, thin, hyaline, except the mouth-parts and a median longitudinal patch of the pygidium, which are yellow. The median lobes are very strongly chitinised, the dense area extending slightly

backward into the pygidium, where it terminates in a \pm crenulate arc. Only one pair of lobes present. These often appear worn in mounted specimens, the two extreme types being illustrated (figs. 147, 147a). Antennae each consisting of a low tubercle and *two* curved spines of moderate length. Leonardi states that there is *one* short seta, but this condition is often observed in broken specimens. The plates are very unusual and characteristic, being broadly rounded at their extremities and supplied with spiny or finger-like projections, making them spur-like. Parastigmatic glands present; anterior spiracles with 10–12, posterior with 4–6. Circumgenital glands present, very numerous, in 5 groups:—

28—60
22—32 22—32
28—40 28—40

Habitat: On *Acacia horrida*, Willd., Pretoria; collected by the writer, 17th October 1914. On *Acacia horrida*, Willd., Grahamstown and Bathurst, C.P., and on willows, Pretoria and Johannesburg; collected by C. P. Lounsbury. On willow, Boksburg; collected by C. Fuller, 18th August 1914.

Collection Nos.: 154, 154a, 207, 207a.

128. *Diaspis rhusae*, sp. n. (Plate xv, fig. 146).

Scale of adult ♀ about 2 mm. in diameter, normally circular, sometimes elongate owing to position near midrib of leaf; very convex, but rounded at top; margins flat, sometimes slightly turned up; colour sordid white to buff, opaque, with the median area slightly brownish. In some specimens the sides are corrugated and give the scale a shell-like appearance. Exuviae central or nearly so, yellow; second exuviae covered.

Puparia of ♂♂ collected together on the leaves and partly obscured by numerous silky hairs; somewhat elongate, non-carinate, with yellow exuviae.

Adult ♀ viviparous, mounted specimens containing well-developed larvae. Body pear-shaped, thin, hyaline, evenly rounded in front. Abdominal segments not produced, posterior two with glands, plates and a few hairs. Antennal tubercle small, with two short curved spines. Pygidium with 3 distinct pairs of lobes; L_1 large, wide apart, with the inner edges serrate, vertical at first, then widely divergent (fig. 146); L_2 and L_3 with large inner lobule and minute outer one, both with entire margins and striate. P generally simple, occasionally forked or fully branched at the tip. Four or five oblique dorsal gland openings on each side, near the margin. Parastigmatic glands present, 2 or 3 at the anterior spiracles only. Circumgenital glands 0.

Habitat: On native bush (*Rhus* sp.) associated with *Aonidia rhusae*, sp. n., Rondebosch, C. P.; collected by C. P. Lounsbury, 15th June 1915

Collection No.: 161.

129. *Diaspis (Aulacaspis) fulleri*, Ckll. (Plate xv, fig. 144).

Diaspis crawii var. *fulleri*, Ckll., The Entom., xxxiv, p. 225, 1901.

Aulacaspis crawii fulleri, Fernald, Catalogue, p. 233, 1903.

Scale of adult ♀ about 2 to 2.4 mm. in diameter, nearly circular or somewhat elongate, flat, white, smooth, with dark brown exuviae. The exuviae are often (C507)

central, but in many specimens they are pushed to one side, near, or at the margin. The 1st exuviae are paler than the 2nd and situated at the extreme margin or slightly away from the second.

Puparium of ♂ white, strongly tricarinate, with yellow exuviae.

Body of adult ♀ elongate, almost twice as long as its greatest width. Anterior part rather more heavily chitinised than the abdominal region and the pygidium. Front margin flatly rounded, terminating on each side with a rounded prominence at the level of the mouth-parts. The three free abdominal segments are broadly rounded and well defined at the margins. The pygidium is at first rounded and then tapers suddenly and straightly to the median lobes. Circumgenital glands in 5 large groups :—

	31	
55		55
39		39

Formula : $L_1, G, 11_2, P_3, G, 11_4, P_5, GG, -, P_6, G.$

Habitat : On *Melia azedarach*, Natal (Fuller), and Pretoria, collected by the writer July 1915. On *Ricinus* sp., Durban ; collected by A. Kelly, 1910.

Collection No. : 164.

130. ***Diaspis (Aulacaspis) pentagona***, Targ. (Plate xv, fig. 145).

Diaspis pentagona, Targ., Rev. di Bacch., No. 11, 1885.

Diaspis amygdali, Tryon, Rept. Insect and Fungus Pests, p. 89, 1889.

Diaspis lanatus, Morg. & Ckll., Jl. Inst. Jamaica, i, p. 137, 1892.

Diaspis patelliformis, Craw, Fifth Bien. Rept. Cal. Bd. Hort., p. 39, 1896.

Diaspis amygdali, Green, Cocc. Ceylon, i, p. 87, 1896.

Diaspis pentagona, Newst., Mon. Brit. Cocc., i, p. 173, 1901.

Diaspis amygdali, Fuller, First Rept. Ent. Natal, p. 102, 1901.

Scale of adult ♀ about 2 to 2.75 mm. in diameter, nearly circular to long, \pm pyriform, flattish to convex or conical, white to greyish, the colour being chiefly due to the admixture of epidermal tissues of the host-plant, with exuviae subcentral to near one margin. The exuviae are orange-yellow to reddish brown. In young specimens the form of the scale is often elongate, with the exuviae at or near one extremity, and this form is retained in a few adult insects. The ventral scale is very thin and delicate.

Puparium of ♂ elongate, white, faintly tricarinate or feebly keeled, with pale exuviae.

Adult ♀ and ova yellowish to bright pink according to host-plant, usually pink. Body of adult ♀ short egg-shaped or broad pear-shaped, thin, hyaline. The lobes are heavily chitinised and yellow. The abdominal segments are not greatly produced and are broadly rounded. The antennae are placed close together and near the anterior margin. The antennal tubercles are bi-lobed and each bears a long curved seta. L_1 large, somewhat triangular with rounded apex, both margins \pm deeply crenulate ; L_2 composed of two lobules, the inner one longer than wide, almost parallel-sided, with rounded apex, the outer lobules small, \pm triangular ; L_3 composed

of two \pm even lobules, shorter than L_2 . P strong, dagger-shaped; usually entire, but occasionally divided at their extremity (fig. 145). Parastigmatic glands numerous at the anterior spiracles, where usually about 15 are arranged in an anterior crescent-shaped group. Circumgenital glands in 5 large groups:—

6—25

13—49 13—49

10—41 10—41

Formula: L_1 , $1P_2$, G, 11_2 , P_3 , G, L_3 , P_4 .

Historical Note. The following interesting note appears in Mr. Lounsbury's Annual Report for the year 1898, pp. 32-34:—

“*Strange behaviour of Peach Scale in St. Helena.*—It is possible that an efficient check for our white peach-scale (*Diaspis amygdali*) exists at St. Helena. The basis for this conjecture is the recorded statement that a century ago the peach trees of the island suffered greatly from the attacks of a white scale-insect which has since wholly disappeared from notice. Kirby and Spence, writing in 1815 (page 113, seventh edition), thus speak of the pest: ‘A coccus, as it should seem from the description, imported about thirty years ago from the Mauritius or else with the Constantia vine from the Cape of Good Hope, has destroyed nearly nine-tenths of the peach trees in the Island of St. Helena, where formerly they were so abundant, that, as in North America, the swine were fed with their fruit. Various means have been employed to destroy this plague, but hitherto without success.’ Reference is made to an older work, ‘Description of the Island of St. Helena,’ from which the information was probably derived. I have not had access to this second book, but in Melliss’s ‘St. Helena,’ published in 1875, is a long extract from it, in which the insect is described in such terms as to leave little doubt in my mind that it was the scale now known as *Diaspis amygdali*. The pest is said to settle on the trunk of the tree and to there form a white crust, a peculiarity that at once brings our white peach scale to mind. Continuing, the old writer, as quoted by Melliss, says: ‘It attacks other trees, particularly the native gum-wood trees and the mulberry, but the trunk of the peach seems to be its favourite lodgement.’ Next to the peach, the mulberry suffers more than any of our other trees from the present-day scale. Melliss in his work, after relating what a severe pest the insect was formerly, goes on to state that the peach trees of his day enjoy immunity from the trouble, and expresses the belief that the pest had run its course and then naturally disappeared from the Island, a fate which he intimates had also befallen other introduced insects, notably the death’s head moth, *Acherontia atropos*. It seems to me, however, that some trace of the scale must still exist, and associated with it a powerful natural check. Through the kindness of friends, the subject has been brought to the notice of his Excellency, the Governor of the Island, and he has written to say that diligent search will be made in the old gardens, and that should any insect answering the description be found, specimens will be forwarded to me. The result of the enquiries is awaited with much interest, but even should no occurrence of the insect be located, I would not think it conclusively shown that the insect is now extinct, for a few scales here and there would probably be overlooked by anyone not experienced in searching for this type of insect. It may be remarked that *Diaspis amygdali* is known both at the Cape and Mauritius, the one or the other of which countries, as stated above,

is credited with having furnished St. Helena with the peach scourge. It may have been here since the early days, but I know of no evidence whatever to show that it is native. An old volume records the occurrence of a white pest on peach in Mauritius sixty years ago, and it seems to be more likely that Mauritius or some oriental country furnished St. Helena the pest than this country. St. Helena was a port of call for ships returning from the Indies in by-gone days, and the occurrence of the insect in the far east is now established. But wherever the insect may have originated and whatever place may have been responsible for St. Helena's getting the pest, we know that *Diaspis amygdali* is now and has long been a destructive enemy to the peach at the Cape, and is now also highly injurious in Mauritius. It is also coming into prominence in most of the warmer countries and threatens to prove a cosmopolitan scale pest of considerable importance. It endures a very wide range of temperature and thrives not alone on peach, mulberry, and several other common fruits, but also on many ornamental and shade trees and shrubs, on a number of worthless weeds, particularly certain shrub-like perennial *Solanums* and on some of the *Acacia* tribe that have been planted or sprung up along roads and in waste places in the Cape and other districts. More complaints regarding it are made to this office than about any other insect, with the exception of red scale. If nothing of value is learned from the enquiries now being prosecuted at St. Helena, it may be well worth the while for our Government to send an expert to the island to thoroughly investigate the subject; even should nothing further be learned of the scale it is possible that the agent that suppressed it—perhaps now existing at the expense of other scale-insects—may be discovered and brought to our country."

It may be mentioned that nothing came of the enquiries instituted in 1898 and nothing further was known of the occurrence of this species in St. Helena until Mr. Lounsbury's recent visit to the island (January 1916). It was by no means conspicuous in the gardens, but a careful search revealed its presence and specimens were brought for this collection. Sufficient material was collected to demonstrate the presence of a Hymenopterous parasite, but nothing has yet been done to ensure its establishment in this country.

Habitat: This scale is common on a number of nursery plants, including almond, fuchsia, geranium, kaffir-boom (*Erythrina* sp.), castor-oil plant, lilac, peach, pear, pepper, plum, poplar, mulberry, veronica, etc.

Collection Nos.: 165-165b.

131. ***Diaspis (Epidiaspis) conspicua***, sp. n. (Plate xv, fig. 149).

Scale of adult ♀ clustered in association with those of *A. pectinatus* on twigs of privet in Pretoria. The ♂ puparia are whitish and comparatively large, with parallel sides, and are particularly conspicuous because they are attached to the stem only by their anterior end and project in all directions from between the clustered ♀ scales.

Scale of adult ♀ \pm circular, convex, about 2 mm. in diameter, dark greenish to almost black, with brown exuviae. The body is broad pear-shaped, with the abdominal segments flatly rounded and only faintly indicated at the margin. The pygidium has very distinctive characters. There is an interrupted transverse band of chitin slightly posterior to the vulva and one long bar on each side at right

angles to this. The vulva is wide, set about three times the distance of the anal opening from the median lobes. There is only one pair of lobes, which are large, with their inner faces in close contact with one another, the outer margins curving slightly outward and once notched at about two-fifths their length. The plates and spines are very long and unusual, as illustrated (fig. 149). Circumgenital glands 0.

Formula: $L_1, P_2, S, P_3, S, 2P_4, —, S, 2-3P_5$.

Remarks. This species is very close to *Aspidiotus spiniger*, Lindinger, but differs in the lobes and plates and the longer spines.

Habitat: On privet, Pretoria; collected by B. Delpont, June 1915. On *Acacia*, Kroonstad; collected by A. Kelly, 12th December 1916. On *Gardenia fortunei*, Kabah, Uitenhage; collected by A. Kelly, 27th February 1917.

Collection No.: 217.

Genus **Chionaspis**, Sign.

Scale of ♀ elongate, often \pm parallel-sided, but may be conspicuously broadened or even pyriform, and usually \pm convex. Colour most commonly white. Texture varying from thin and pearly to thick and chalky or cottony. Exuviae at the anterior extremity, the first naked and partly overlapping the second, which is usually \pm covered with a layer of secretion. Colour of exuviae usually yellowish or brownish. Ventral scale often but slightly developed, or strongest at the anterior end.

Adult ♀ usually elongate, and broadened posteriorly, distinctly segmented. Pygidium with usually 2 or 3 pairs of lobes and simple spine or dagger-shaped plates. Second pair of lobes, and third pair when present, often composed of two lobules. The glandular plates are usually simple, but may be slightly divided at their extremities. Dorsal glands numerous, marking the primitive segments and most variable towards the posterior end of the pygidium. Circumgenital glands absent or present.

Male puparium small, elongate, \pm smooth to uni- or tri-carinate.

The following sub-genera are used, but the classification of species into them is not so easy a matter as would appear. In the present paper such a classification has not been strictly attempted.

A. Circumgenital glands in 5 groups.

(1) Median notch of pygidium not thickened; median lobes not in close contact nor fused *Chionaspis*, s. str.

(2) Median notch not thickened; median lobes in close contact or fused together *Pinnaspis* (*Hemichionaspis*).

(3) Median notch of pygidium thickened and strongly chitinated *Phenacaspis*.

B. Circumgenital glands in more than 5 groups.

(4) As in *Chionaspis* (s. str.), but with circumgenital glands usually in 8 groups, often extended into a bow !. *Poliaspis*.

C. Circumgenital glands absent.

(5) Ventral scale usually robust; anterior portion of body of adult ♀ generally highly chitinated *Dinaspis*.

132. *Chionaspis exalbida*, Ckll. (Plate xv, fig. 151).

Chionaspis exalbida, Ckll., The Entom., xxxv, p. 112, 1902.

The following description is made from material which I find in this collection labelled "On aloe, Howick, coll. Fuller, Part of original material submitted to Prof. Cockerell, No. 5 of second lot sent Sept 21, 1901." I am somewhat disturbed because I am satisfied that the label is correct, but the characters do not agree with the description given by Prof. Cockerell. I have an abundance of material on aloe from different parts of the country, but I have failed to find in this a species which is without circumgenital glands and which could thus agree with the description given of *exalbida*.

The scales of the adult females agree perfectly with the description given. They are massed together in large numbers so as to cover entirely large patches of the leaves. They are about 1.6 to 2 mm. long, narrow, in some cases slightly broadened and flattened behind. The secreted portion is dull white and smooth, not markedly chalky, but varying considerably in texture and in the prominence of the transverse growth lines. The exuviae are yellowish or orange-brown, the second pellicle being covered by a layer of secretion, except at the posterior end, which remains naked. In old dry specimens the anterior portion of the second pellicle often shows through the secretionary layer greyish in colour.

The male puparium is similar but smaller, with parallel sides, and usually \pm distinctly tricarinated, with the median ridge well pronounced. In a few examples the margins are low, giving the impression that the puparium is uni-carinate.

The adult ♀ turns green in boiling KOH. When cleared and mounted the insect is about 1 mm. long and 0.4 mm. broad, narrowed at each end, and slightly widest behind the middle. The body is entirely transparent, the pygidium not appearing more highly chitinised than the remainder of the body. The antennae are prominent, \pm oval tubercles; the margin of the abdominal segments are not produced; there appears to be one comparatively large gland-pore lateral to each of the anterior spiracles. The characters of the pygidium are very indefinite. There are probably two pairs of lobes, as indicated in the figure, but the projecting parts are very delicate, and these, as is also the case with the plates, are often bent back in mounting, and in many instances they might be considered absent (fig. 151). There are 5 well defined groups of circumgenital glands, the median with 8 to 14, the anterior laterals with 13 to 18, and the posterior laterals with 6 to 14, usually 10.

Remarks. What I consider to be a variety of this species is found on aloes in Johannesburg. The female scales appear slightly larger than normal for the species, and the secreted portion of the scale is somewhat roughened, almost felted. The first exuviae are usually yellowish brown and the secretionary layer over the second pellicle appears to extend further back than in typical *exalbida*, but in stored material it is usually flaked off. The exuviae of the male puparia are generally a little darker than in the type.

In mounted material the pygidium presents the same indefinite characters; but in looking over a number of slides it appears that the plates are possibly a little more delicate and hence more often appear to be absent, and the lobes a little longer and narrower.

Habitat: On aloe, Howick, Natal; collected by C. Fuller. On aloe, Port Elizabeth; collected by C. P. Lounsbury, April 1901. On aloe, Eshowe, Zululand; collected by C. Fuller, 17th July 1907. On aloe, Johannesburg, June 1910 (Cape No. 1520). On aloe, Barberton, Tvl.; collected by A. Kelly, Nov. 1914. On aloe, Johannesburg; collected by the writer, July 1915.

Collection No.: 141.

133. ***Chionaspis margaritae***, sp. n. (Plate xv, fig. 148).

Scale of adult ♀ about 2·5 mm. long, moderately broad and convex, white, very smooth and glossy or pearly in appearance, with brownish exuviae. The second exuviae are sometimes only very slightly covered and can be seen quite easily. In the other cases the scales and also the covering of the second exuviae are much more robust. The whole scale has an extremely regular, smooth and neat appearance.

Adult ♀, when mounted, regular in outline, somewhat narrowed in front and with the anterior part of the body slightly more chitinated than the remainder. Abdominal segments not produced but broadly rounded, and conspicuous by the numerous gland openings; close to the marginal gland areas of the three anterior abdominal segments, but a little nearer the median line, is a series of carrot-shaped glands, which often appear in optical section as broad, conical spines. The pygidial margin (fig. 148) is broadly rounded and slightly but straightly notched in the middle. L_1 small, with more or less straight sides and pointed ends; L_2 consisting of two lobules, of which the inner is the larger, both lobules \pm trilobed with outer end rounded. Marginal glands large and conspicuous. Plates of moderate length, simple, dagger-like. Circumgenital glands in 5 groups:—

7—8

18—23 18—23

34—40 34—40

Remarks. This species is very much like *Chionaspis capparis* (q.v.), but may be readily distinguished by the sublateral gland area of the first three abdominal segments and the more numerous circumgenital glands.

Habitat: On aloe (Cape Accession No. 1269, of which the data have been lost).

Collection No.: 179.

134. ***Chionaspis humilis***, sp. n. (Plate xv, fig. 150).

The insects are clustered on the leaves of the host-plants and large numbers of the narrow male puparia are found clustered together on the lower parts of the leaves. The scale of the adult female is about 2 mm. long, white, comparatively broad, usually robust and convex, but in some cases appearing rather loosely constructed; broadest just behind the middle, when it may terminate behind abruptly or be somewhat extended and pointed. The exuviae vary considerably; in some the first pellicle is glassy and almost colourless, but in the majority of cases it is slightly yellowish. The second exuviae are thinly covered with a layer of secretion, through which they show yellowish to brown. In old material it is a common occurrence for the anterior part of the second pellicle to appear greyish and the hind margin to look almost naked and yellow. When the scales occur singly on the

leaves they are generally regular in outline, but when a large number are congregated with male scales in the axils of the leaves they are often distorted. Ventral scale delicate, adhering to the leaf. Male puparium small, linear, white, with bright pale yellow exuviae. The secreted portion usually has a very strong median keel.

Adult ♀, mounted, about 1.2 mm. long, evenly elliptical, with both ends about equally rounded; very transparent, not highly chitinised. The abdominal segments are not prominently produced but are flatly, broadly rounded. L_1 narrow, very divergent, with their outer ends free, and always a little further back than L_2 ; L_2 broadly rounded, rather close to L_1 , with a short plate on either side. In some cases there is an indication of a rudimentary L_3 opposite the opening of the second conspicuous gland opening. P short, dagger-like, with broadened bases. The pygidium as illustrated (fig. 150). Circumgenital glands in 5 compact groups:—

8—12

14—17 14—17

12—15 12—15

Formula: $L_1, P_2, L_2, P_3, G, G, L_3, P_5, G, G$.

Habitat: On aloe, Grahamstown, C.P.; collected by C. P. Lounsbury, August 1906. On aloe, Pretoria; collected by the writer, November 1914. On grass, Pretoria; collected by C. P. Lounsbury and the writer, September 1914.

Collection No.: 149, 149a, 180.

135. ***Chionaspis natalensis***, Mask. (Plate xvi, fig. 152).

Chionaspis spartinae var. *natalensis*, Mask., N.Z. Trans. xxviii, p. 390, 1896.

Chionaspis natalensis, Fernald, Catalogue, p. 220, 1903.

The scale of the adult ♀ is about 2 mm. long, narrow, slightly broadened behind, white, with yellow exuviae.

I have not been able to obtain fresh specimens of this species, but have been fortunate enough to secure two slides from Mr. Arnold W. Cooper, of Richmond, Natal. These were made in May 1895 and are apparently from part of the original material submitted to Mr. Maskell.

The male puparium is "white, elongated, cylindrical, carinated, length about $\frac{1}{30}$ inch" (Maskell).

The insect is elongate, about 1.4 mm. long, narrowed at each end. The specimens I have before me have not been treated with potash, but mounted direct with the scales into Canada balsam. They are fairly satisfactory for observing the characters of the pygidium, but other characters, such as the antennae, parastigmatic glands, etc., cannot be determined. The pygidium is as illustrated (fig. 152). The entire margin appears slightly thickened and the lobes are delicate and not always visible. The second lobes consist each of two rounded lobules. The circumgenital glands are in 5 group:—Median 8—13, anterior laterals 17—24, posterior laterals 14—20.

Habitat: On "wire-grass" Richmond, Natal; collected by A. W. Cooper, May 1895.

Collection No.: 142.

136. *Chionaspis stanotophri*, Cooley (Plate xvi, fig. 153).

Chionaspis stanotophri, Cooley, Spec. Bull. Mass. Exp. Stn., p. 35, 1899.

Professor Cooley's description, omitting plate references, is as follows :—

"Scale of Female.—Length 2.2–2.6 mm. Moderately elongated, distinctly convex, firm in texture, clear white in color. Exuviae .8 mm. long; lemon-yellow or orange-yellow in color.

"Female.—Three pairs of lobes are present. Median pair rounded, divergent, striate, entire; separated at their bases by a distance nearly equal to the width of one of the lobes. Lobules of the second pair rounded, entire, striate. Third pair varying in degree of development; composed of two broad, short, striate, entire lobules. The lobes are very slightly, if at all, darker than the remainder of the pygidium. In general appearance the median lobes resemble those of *pinisoliae* but they are further apart. The gland-spines are arranged as follows: 1–2, 1–2, 1–2, 3. There are four distinct spines at the base of each of the median lobes, two above and two below. Second row of dorsal gland-orifices represented by the anterior group consisting of 1–4 orifices. Third row with 4 orifices in the anterior and 5–6 in the posterior group. Fourth row with 4 orifices in the anterior and 5–6 in the posterior group. Median group of circumgenital gland-orifices, 7–12; anterior laterals, 18–24; posterior laterals, 15–17.

"Scale of male.—Length, 1.1–1.2 mm.; distinctly tricarinate. Exuvia lemon-yellow or brownish, occupying scarcely one-third the length of the scale."

Habitat: On buffalo grass (*Stanotaphrum glabrum*), Cape Town. On *Eulalia gracilis*, Maritzburg; collected by A. Kelly, April 1915. On Rhodesian lemon grass, Richmond, Natal; C. Fuller, 1899. On grass (sp. indet), Zoo, Pretoria, and on grass (sp. indet) Ceres, C.P.

Collection Nos.: 144–144d.

137. *Chionaspis capparisi*, sp. n. (Plate xvi, fig. 154).

Scales clustered on the twigs and stems of the host-plant.

The female scale is about 2.2 mm. long, comparatively wide for its length, moderately convex, widest about the middle, clean specimens appearing slightly glossy but felted. Exuviae brown. In some cases the second exuviae appear to be covered with a very slight film of whitish secretion, but as a rule they are naked.

Male puparium white, non-carinated, exuviae yellowish or yellowish brown.

Adult ♀ viviparous, mounted specimens containing numerous well-developed larvae. Adult ♀ mounted, about 1.5 mm. long, comparatively wide, widest a little behind the middle, narrowest at anterior end; margin regular; abdominal segments not produced and but faintly indicated at the margin; body faintly chitinised. Lobes small and inconspicuous, as figured (fig. 154). P long, simple, dagger-shaped. Circumgenital glands in 5 groups :—

3—4

4—9

4—9

8—13

8—13

Formula: $L_1, P_2, G, L_2, P_3, G, -, P_4$.

The scales of this species, both ♂ and ♀, are similar to those of *Dinaspis lounsburyi*, Leon., but the insect itself differs from that species in having the anterior part of the body less chitinated, in a few of the pygidial characters, and in the possession of circumgenital glands.

Habitat: On witgatboom (*Capparis albitrunca*, Burch.), Cape Peninsula?; collected by C. Fuller, 1898.

Collection No.: 146.

138. **Chionaspis retigera**, Ckll. (Plate xvi, fig. 162).

Chionaspis retigera, Ckll., The Entom., xxxiv, p. 249, 1901.

Professor Cockerell's description is as follows:—

"Scales crowded on twigs; white, the exuviae orange-brown. ♀ scale mytiliform, about $1\frac{1}{2}$ millim. long, straight or curved, very convex, the transverse growth-lines rather conspicuous; second skin more or less covered with white secretion. ♂ scale of the usual shape, rather broad, with a barely indicated median keel; exuviae bright orange.

"♀ dark brown, subpyriform, or rather club-shaped, the anterior end being much narrowed; median lobes rounded, very low, rudimentary, but conspicuous because of their dark colour; two other lobes barely indicated by low rounded structures; spine ordinary; squames long and spine-like; anal orifice far from the hind end; five groups of circumgenital glands, the posterior laterals about 10, anterior laterals about 8, median 6; submarginal region with large reticulated patches, transversely elongate, making the five posterior segments, the last pair longitudinally elongate, and situated about the region of the lateral circumgenital glands; mouth-parts large.

"♀ second skin. Mouth-parts between the anus and the hind margin of the body; median lobes large, quadrate, separated by a rather wide interval; margin on each side of median lobes strongly serrate; squames long and spine-like. Some individuals of the third stage, presumably not quite mature, show also the large quadrate median lobes, with wavy-truncate ends."

After examining a large number of specimens I am convinced that the large quadrate median lobes are normal for this species. The typical form of pygidium is illustrated. The large reticulated patches mentioned by Professor Cockerell are the large collections of dorsal gland openings. Circumgenital glands in 5 groups:—median 6—10, anterior laterals 8—12, posterior laterals 10—14.

Habitat: On a number of native plants, including witgatboom (*Capparis albitrunca*, Burch.), Durban, Natal, and East London, C.P.

Collection No.: 143 and 143a.

139. **Chionaspis euphorbiae**, sp. n. (Plate xvi, fig. 156).

Scale of adult ♀ about 2 mm. to 2.5 mm. long, white, gradually broadening to beyond middle; posterior end \pm flattened and broadly rounded, straight or slightly curved. The scale is not glossy, but shows numerous small transverse ridges, which are close together and generally greyish owing to the collection of foreign matter. First exuviae pale, brownish, second exuviae covered.

Male puparium small, white, with orange exuviae, smooth to faintly carinated.

Adult ♀ (mounted) 1·4 mm. long, broadly oval, not much narrowed at either end. Anterior two-thirds moderately chitinous, yellow, posterior third colourless, transparent. The pygidial margin is richly supplied with gland openings, which form practically a continuous row, in some places two deep. The rows of dorsal glands are interrupted, the last arising from the margin with two or three openings and then interrupted to near the anal opening, where there are 2 or 3 others. The penultimate row has 3 or 4 near the margin, then two groups of 2 to 4 on each side to just beyond the anus. The lobes and plates are small, as shown in fig. 156. Circumgenital glands in 5 groups:—

	2—4	
14—20		14—20
19—22		19—22

Habitat: On *Euphorbia*, in association with *Hemilecanium* sp. and *Selenaspidus pertusus*, East London, C.P.; collected by Miss Impey, 23rd June, 1915.

Collection No.: 151.

140. **Chionaspis chaetachmae**, sp. n. (Plate xvi, fig. 157).

Scale of adult ♀ large, 3 to 3·4 mm. long, elongate, white, smooth, glossy, very long and narrow. Exuviae brownish; second exuviae completely covered with secretion. Ventral scale apparently formed by the thick inturned edge of the dorsal scale. Many of the female scales are arranged around the extreme margins of the leaves. In a few cases, where holes appear in the leaves the margins of these are also edged with ♀ scales.

Male puparium about 1 mm. long, very flat, white, non-carinated; exuviae straw-coloured.

Adult ♀ about 2 mm. long, narrow in front and gradually broadening until about the posterior third or suddenly widening to region of mouth-parts and then almost parallel-sided to the rounded pygidial margin. Body integument delicate, not chitinated, except mouth-parts and lobes. The pygidium is regularly rounded. The last row of dorsal glands does not reach the margin, but consists of 7 to 9 pores sloping outward and backward from the level of the hind margin of the anal opening. The lobes and plates are as illustrated in fig. 157. Circumgenital glands in 5 groups:—

	4—9	
16—23		16—23
36—46		36—46

Habitat: On “umkavoto” (*Chaetachme aristata*), Durban; collected by C. Fuller, 12th October 1914.

Collection Nos.: 152 and 152a?

141. **Chionaspis (Phenacaspis) visci**, sp. n. (Plate xvi, fig. 160).

Scales massed on stems of host-plant.

Adult ♀ scale about 2·2 mm. long, elongate, \pm parallel-sided, convex, usually straight, \pm silky, white, with transverse ridges small, numerous, close together. First exuviae greyish or brownish; second exuviae covered, brown.

Male puparium white, moderately elongate, usually with a prominent median ridge and two lateral ones, which are especially conspicuous at the posterior end. Exuviae pale, yellowish or almost colourless.

Adult ♀ (mounted) about 1.6 mm. long, widest (0.7 mm.) some distance behind the middle; abdominal segments not produced but distinctly indicated at the margin; body not noticeably chitinated. The median notch is wide, with two short plates and two short spines. L_1 wider than long, uniformly rounded when not worn; L_2 composed of two lobules, which may be somewhat rounded, but most often pointed. Beyond these there is a plate, then two or three angular projections from the margin, a short spine and a plate. Each segment is indicated rather sharply by the hind angle being slightly produced. The last row of dorsal glands is interrupted near the margin and is somewhat doubled, 3 to 4 pores lying inside, and 2 or 3 outside; the main series, which comprises 6 or 7 pores, does not reach so far back as the anus. Circumgenital glands in 5 groups:—

3—4
5—12 5—12
13—18 13—18

Habitat: On mistletoe, N.E. Transvaal; collected by Mr. Mogg, 20th October 1914.
Collection Nos.: 148, 148a.

142. **Chionaspis globosus**, sp. n. (Plate xvi, fig. 155).

Scale of adult ♀ small, about 1 mm. long, very convex, almost globular, shiny white, with very pale yellowish to orange-brown exuviae.

Puparium of ♂ white, with a broad median rounded ridge; pellicle pale yellow or orange.

Adult ♀ broadly oval, with the two extremities about equally rounded, thin, hyaline, with the posterior margin exhibiting a series of rounded projections. The largest represent the margins of the three abdominal segments, the remainder of the pygidium consisting of smaller round projections. No lobes. The position usually occupied by the median lobes is slightly recessed and bears two short plates. On each side of this there are two gland openings followed by a flatly rounded protuberance, then two more gland openings, another protuberance, two more glands and a rounded protuberance which terminates at the junction of the last free abdominal segment (fig. 155). Parastigmatic glands present, 4 to 5 at anterior spiracles. Circumgenital glands in 5 groups:—

3—5
4—6 4—6
4—7 4—7

Habitat: On *Euphorbia* (tree), Seymour, C.P. (Cape Accession No. 1236).
Collection No.: 162.

143. **Chionaspis subnudata**, Newst. (Plate xvi, fig. 158).

Chionaspis subnudata, Newst., Zool. Anthr. Ergeb. Westl. Zentr. Sudafr. p. 20, 1912.

"Puparium of female, broadly pyriform, faintly and irregularly striated transversely, white, with a trace of pale slaty grey anteriorly; larval pellicle varying from yellow to dark grey or dark brown. Length, 1.75 to 2 mm.

"Puparium of male white, with a sharply defined median ridge, sides rounded.

"Female, adult. Subpyriform, widening considerably in the region of the free abdominal segments; gradually and widely rounded posteriorly; narrowest in front. Rudimentary antennae with one long curved spine and two very short ones. Anterior stigmata with 4 parastigmatic glands; posterior pair without glands. Circumgenital glands in five groups, formula of two examples:—

9		8	
14	12	12	12
14	15	13	14

Anal orifice opposite the lower lateral groups of spinnerets. Fringe of pygidium [fig. 158] almost denuded of appendages; median lobes very short, broad, with the inner margins touching, so that in some examples they appear as if fused. There is a single long spine on either side of the lobes and beyond them one or two smaller ones. Dorsal pores numerous and extending to the margin.

"Closely allied to *Chionaspis nudata*, Newst., but easily distinguished from this species by the form and position of the median lobes and also the shape of the adult female.

"*Habitat*: Sudwestafrika, Groot Namaland, Brukkarossberg, August 1905, Dr. L. Schultze. On an unknown plant called *Lobarus*." (Newstead).

144. *Chionaspis mytilaspiformis*, Newst. (Plate xvi, fig. 161).

Chionaspis mytilaspiformis, Newst., Zool. Anthr. Ergeb. Westl. Zentr, Sudafr. p. 19, 1912.

"Puparium of female. Form closely resembling that of the common *Mytilaspis pomorum*, when fixed to the slender stem of its food-plant; a few forms are, however, more or less straight, but all are highly convex. Length, 2 to 2.25 mm.

"Female, adult. Very elongate, narrowest in front. Antennae with two long, stout, curved spines and a minute central one. Anterior stigmata with 4 to 5 parastigmatic glands; posterior pair without glands. Abdominal and thoracic segments with large groups of dorsal glands. Pygidium with five groups of circumgenital glands, the anterior groups represented generally by a few isolated spinnerets. Formula of three examples:—

1		4		7	
12	10	13	11	10	8
28	29	30	30	26	23

"Anal orifice opposite the anterior group of spinnerets. Margin of pygidium [fig. 161]: median pair of lobes generally well developed, anterior edge irregularly and coarsely serrate; second pair quite rudimentary or sometimes obsolete; third pair absent. Squamae spiniform, long. Spines long, slender. Dorsal glands in large and well-marked groups or bands.

"I had, at first, thought that this insect might prove to be Maskell's *C. natalensis*. It certainly bears no resemblance to his extremely poor figure, neither does it agree with his diagnosis. It evidently belongs to the African group, and is nearly related to *C. nerii*, Newstead. The latter has, however, a much longer second pair of lobes, and the anterior group of circumgenital glands are much more numerous.

"*Habitat*: Sudwestafrika, Gross-Namaland, Chamis am Koankil, Sept. 1905, L. Schultze. On *Rhus lancea*, L.f." (Newstead).

145. **Chionaspis Africana**, Newst. (Plate, xvi, fig. 159).

Chionaspis africana, Newst., Zool. Anthr. Ergeb. Westl. Zentr. Sudafr., p. 19, 1912.

"Puparium of female. Rather elongate, widened posteriorly; secretory portion dense, pure white and faintly but irregularly striated; pellicles yellow. Length, 2 mm.

"Female, adult. Ellipsoidal; segmentation in macerated example, very faint. Antennae with one very long apical spine and one minute sub-basal spine. Anterior pair of spiracles with 4-5 parastigmatic glands close to the anterior margin of the orifice; posterior pair similar, parastigmatic glands apparently absent. Pygidium large; circumgenital glands in five groups, formula of one example:—

14
18 19
16 18

"Anal orifice opposite the lower lateral groups of circumgenital glands; position of vaginal orifice doubtful; dorsal glands in two short series, the first the longest, reaching to the distal part of the lower lateral group of circumgenital glands. Margin of pygidium with three pairs of very short lobes, of which the second and third are duplex. There are four bilateral spines; but the squames are either entirely wanting or quite rudimentary and not traceable in the preparations. Length, 1.25 mm.

"The distinguishing morphological characters of this insect are the more or less rudimentary lobes and the relatively few dorsal glands.

"*Habitat*: Sudwestafrika, Steinkopf (Klein Namaland), 1904, L. Schultze. The food-plant is not given, but the puparia were attached to the slender stems of a grass-like plant" (Newstead).

146. **Chionaspis (Poliaspis) kiggelariae**, sp. n. (Plate xvi, fig. 163).

Scales clustered into large wart-like masses on the twigs and stems of food-plant. Majority of scales arranged around the twig, very few with the long axis along the stem.

Scale of adult ♀ large, about 3 mm. long, narrow in front, gradually widening to beyond the middle and moderately broad and rounded behind, smooth, faintly glossy, without distinct growth-lines or covered with a matt deposit which is greyish or yellowish. On willow the clusters of ♀ scales appear greyish white rather than pearly, owing to the admixture of fragments from the bark of the host-plant. Exuviae yellowish to bright reddish-brown; second exuviae faintly covered.

Male puparium comparatively small, non-carinate, with pale yellowish or brownish exuviae.

Adult ♀, dry, dark brown to black; when mounted, elongate, with the whole anterior portion and first abdominal segments uniformly highly chitinated. L_1 shorter than broad, evenly rounded, striate; L_2 similar but smaller, often apparently absent. Antennal tubercle with one long, stout flagellum. Pygidium as illustrated (fig. 163). Dorsal glands very numerous, in continuous groups. Parastigmatic glands present, 6–10 at each anterior spiracle. Circumgenital glands in 8 groups:—

4—9	1—6	5—8
14—20	1—10	14—20
23—36		23—36

In one specimen the median lobe on the left side was doubled, an unusual occurrence.

Habitat: On wild peach (*Kiggelaria africana*, Linn.), Nottingham Road, Natal. On willow, Orchard Siding, C.P.; collected by C. P. Lounsbury, 8th June 1915. On willow, Oudtshoorn (Cape No. 1235).

Collection Nos.: 169, 169a and 169b.

